

Mix Signal Processor

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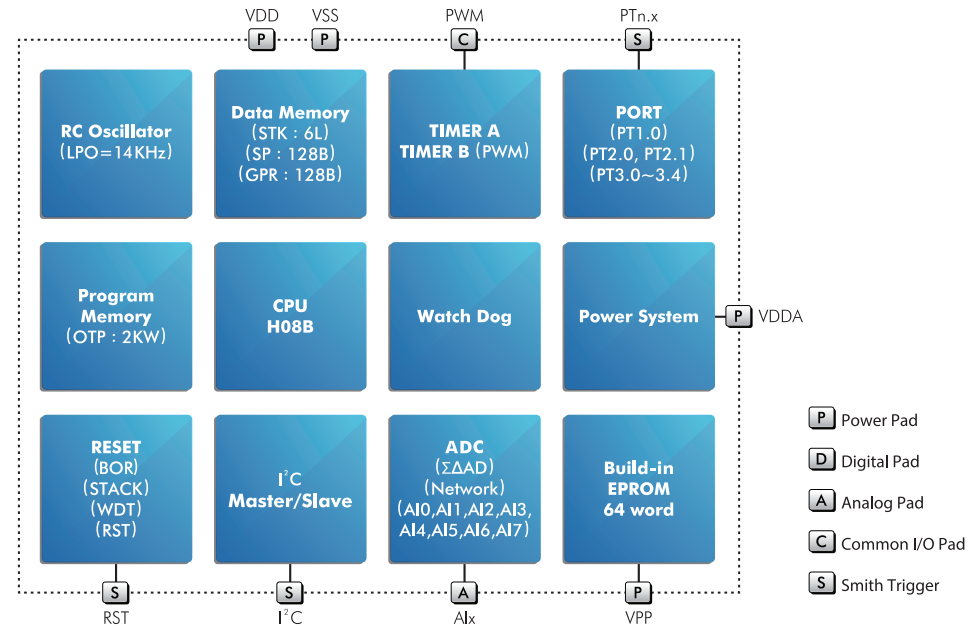
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10th edition : 2024/05

8-bit MCU (OTP Type)

HY10P Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Operation voltage: 2.2V~3.6V
- ◆ Temperature range: - 40°C~+85°C
- ◆ 24-bit ultra low noise $\Sigma\Delta$ ADC (output rate: 8sps~1953sps, 300nVrms @8sps)
- ◆ 2% high speed (2M/3.8M/7MHz) RC Oscillator & low power low speed (14KHz) RC Oscillator
- ◆ PWM: 16-bit x1, 8-bit x2
- ◆ Support built-in EPROM 64 words
- ◆ Support I²C (Master and Slave two communication modes) interface



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	Built-in EPROM (word)	ADC ENOB (bit x ch.)	Sample Rate (sps)	I/O	Timer		PWM (bit x ch.)	Serial Interface	Package
										8-bit	16-bit			
HY10P40*	2.2~3.6	14K 2M 3.8M 7M	14K~7M	2K	128	64	20-bit x6	8~1953	1x1+6xIO	1	1	8-bit x2, 16-bit x1	I ² C Master/ Slave	MSOP10
							20-bit x4		1x1+4xIO					SOP8
							20-bit x8		1x1+8xIO					SSOP16

ADC : 24-bit Sigma Delta ADC.

Timer : Timer A(8-bit) support multi-segment interrupt time setting; Timer B(16-bit) support PWM function, PWM output can be selected as 8-bit or 16-bit.

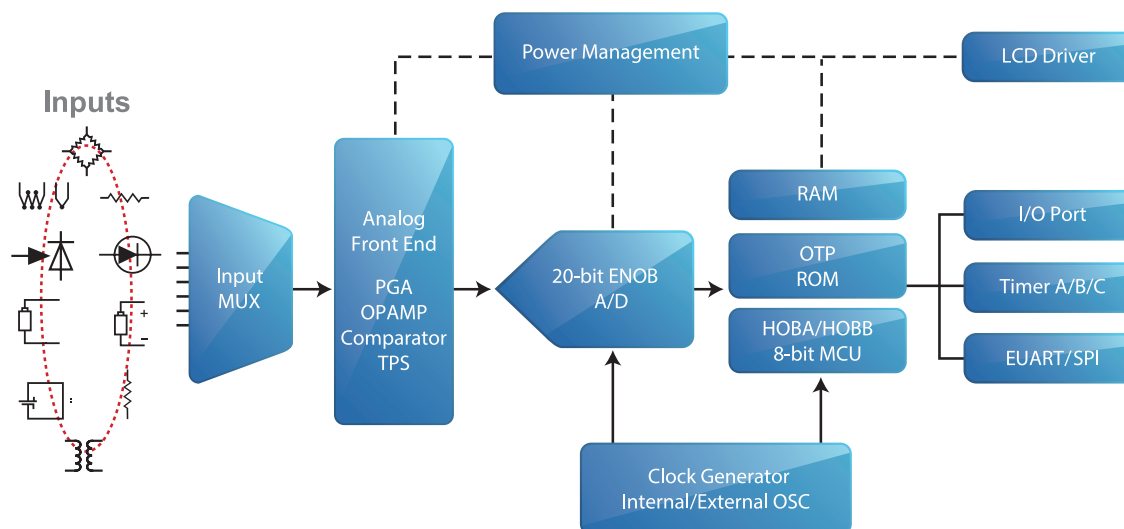
I²C : Support Master and Slave two communication modes.

* : H08B instruction, the main difference is that the instruction set does not contain 8x8 hardware multiplier, 16-bit table read instruction, conditional skip instruction and stack manipulation instructions.

8-bit MCU (OTP Type)

HY11P Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Operation voltage: 2.2V~3.6V
- ◆ Temperature range: -40°C~+85°C
- ◆ 24-bit ultra low noise $\Sigma\Delta$ ADC (output rate: 8sps~Max. 1953sps, 100nVrms @8sps)
- ◆ Comparator for 14 level LVD
- ◆ 2% high speed (2MHz) RC Oscillator & low power low speed (28KHz or 14KHz) RC Oscillator
- ◆ Support 32768Hz & 1M~8MHz external Crystal Oscillator Driver
- ◆ 8-bit PWM: 1ch.~4ch. PWM
- ◆ Support built-in EPROM 64 words or 2.75V Low voltage built-in EPROM (LVBIE) 64 words
- ◆ Max. 4x40 LCD driver
- ◆ Support EUART/SPI interface



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	Built-in EPROM (word)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	OPAMP (type x ch.)	RTC	LCD (com x seg)	I/O	Timer		PWM (bit x ch.)	Serial Interface	Package
														8-bit	16-bit			
HY11P12*	2.2~3.6	28K 2M	28K~8M	2K	128	-	20-bit x4	8~977	Y	-	Y	4x12	4xl + 10xlO	1	-	-	-	LQFP 44 LQFP 48
HY11P13	2.2~3.6	28K 2M	28K~8M	4K	256	-	20-bit x8	8~977	Y	LNAx1	Y	4x20	4xl + 10xlO	2	1	8-bit x1	SPI	LQFP 64
HY11P14	2.2~3.6	28K 2M	28K~8M	8K	512	-	20-bit x8	8~977	Y	LNAx1	Y	4x29	4xl + 12xlO	2	1	8-bit x1	EUART SPI	LQFP 64
												4x40	8xl + 20xlO			8-bit x4		LQFP 100
HY11P23	2.2~3.6	28K 2M	28K~8M	4K	256	-	20-bit x8	8~977	Y	LNAx1	Y	-	10xl + 12xlO	2	1	8-bit x1	EUART SPI	LQFP 32 QFN 32
													7xl + 12xlO					SSOP 28
HY11P24	2.2~3.6	28K 2M	28K~8M	8K	512	-	20-bit x8	8~977	Y	LNAx1	Y	-	18xl + 20xlO	2	1	8-bit x4	EUART SPI	LQFP 44 LQFP 48
HY11P32*	2.2~3.6	28K 2M	28K~2M	2K	128	64	20-bit x3	8~977	-	-	-	4x12	4xl + 8xlO	1	-	-	-	LQFP 44 LQFP 48
HY11P33	2.2~3.6	28K 2M	28K~8M	4K	256	64	20-bit x3	8~1953	-	-	Y	4x20	4xl + 8xlO	2	-	8-bit x1	-	LQFP 64
HY11P35	2.2~3.6	28K 2M	28K~8M	6K	256	64	20-bit x8	8~977	Y	LNAx1	Y	4x32	12xl + 14xlO	2	1	8-bit x4	-	LQFP 100
HY11P36	2.2~3.6	28K 2M	28K~8M	4K	256	64	20-bit x3	8~1953	-	-	Y	4x32	4xl + 8xlO	2	-	8-bit x1	-	LQFP 64
HY11P41	2.2~3.6	28K 2M	28K~2M	2K	128	64	20-bit x4	8~1953	Y	-	-	-	6xl + 5xlO	2	1	8-bit x1	-	QFN 16 SOP 16 SSOP 16
HY11P42	2.2~3.6	28K 2M	28K~8M	2K	128	64	20-bit x7	8~977	Y	-	Y	-	7xl + 8xlO	2	-	8-bit x1	EUART	QFN 24
													7xl + 12xlO					SSOP 28 TSSOP 28
HY11P52* HY11P52B*	2.2~3.6	28K 2M	28K~2M	2K	128	64,LV	20-bit x3	8~1953	-	-	-	4x12	4xl + 8xlO	1	-	-	-	LQFP 48
HY11P54	2.2~3.6	28K 2M	28K~8M	8K	256	64,LV	20-bit x7	8~1953	-	LNAx1	Y	4x32	9xl + 9xlO	2	-	8-bit x1	EUART	LQFP 64
							20-bit x8					4x32	13xl + 12xlO					LQFP 100

ADC : 24-bit Sigma Delta ADC.

OPAMP : LNA (Low Noise Amplifier).

TPS : Internal temperature sensor.

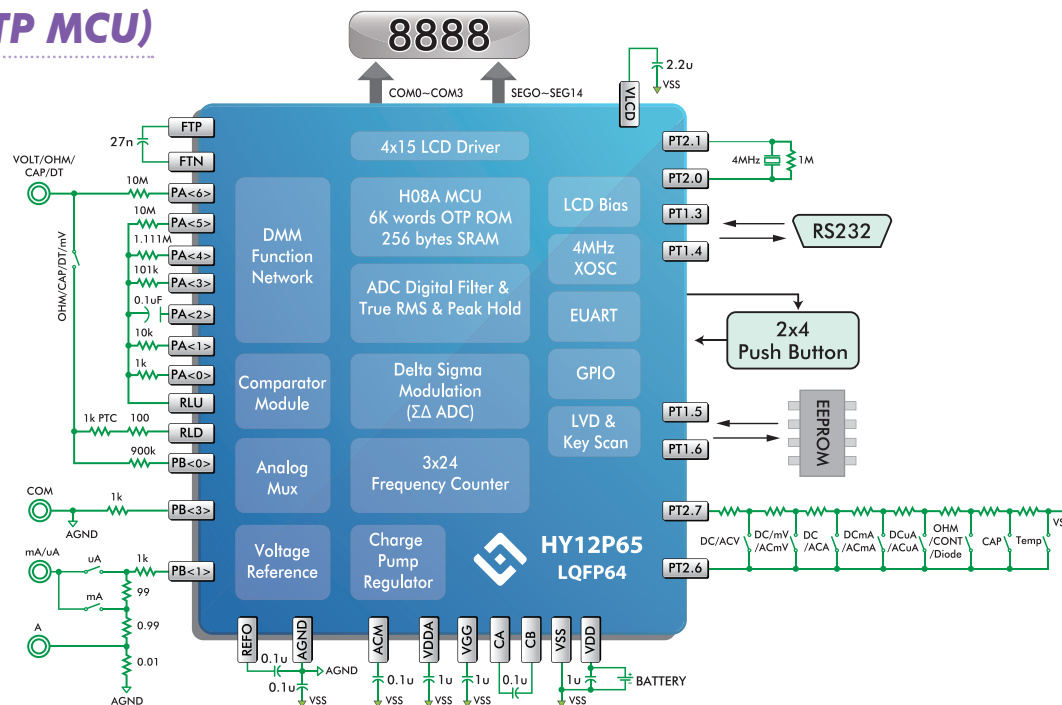
RTC : Support external 32768Hz crystal or 450KHz~8MHz ceramic resonator or 1MHz~8MHz crystal oscillator.

Timer : Timer A(8-bit) support multi-segment interrupt time setting; Timer B(16-bit) support Capture Compare function; Timer C (8-bit) support PWM / PFD function.

* : H08B instruction, the main difference is that the instruction set does not contain 8x8 hardware multiplier, 16-bit table read instruction, conditional skip instruction and stack manipulation instructions.

HY12P Series (ΣΔADC) Main Features

- ## Mix Signal Processor



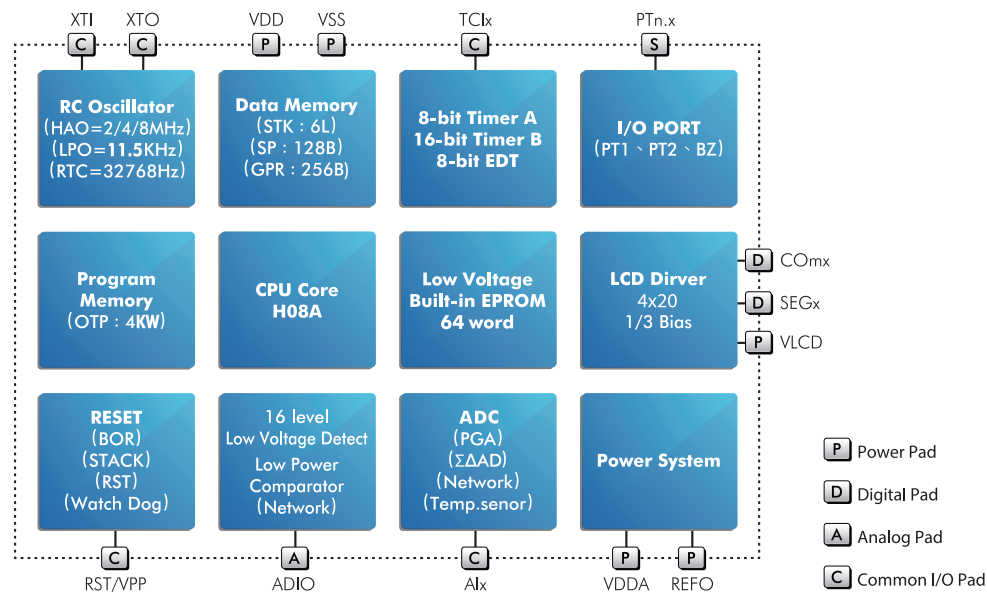
Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	Built-in EPROM (word)	ADC ENOB	Sample Rate (sps)	TPS	PA Network	PB Channel	RTC	LCD (com x seg)	I/O	Timer		PWM (bit x ch.)	Cap.	T-RMS Bandwidth (Hz)	Inrush Current	Peak Hold	Counts	Serial Interface	Package
															8-bit	16-bit								
HY12P62	2.5~3.6	32K4M	32K~8M	4K	256	64	19-bit	10~12.5K	Y	7	3	Y	4x12	13	2	-	8-bit x1	Yes	350	-	-	2,000	-	LQFP64
HY12P65	2.4~3.6	32K4M	32K~8M	6K	256	-	19-bit	10~12.5K	Y	7	5	Y	4x15	19	2	-	8-bit x1	50mF	1.5K	Y	1ms	5,000	EUART	LQFP64
HY12P66	2.4~3.6	32K4M	32K~8M	6K	256	-	19-bit	10~12.5K	Y	7	5	Y	4x15	19	2	-	8-bit x1	50mF	1.5K	-	-	5,000	EUART	LQFP64

RTC : Support external 32768Hz crystal or 450KHz~8MHz ceramic resonator or 1MHz~8MHz crystal oscillator.
Timer : Timer A(8-bit) support multi-segment interrupt time setting; Timer C (8-bit) support PWM / PFD function.

8-bit MCU (OTP Type)

HY13P Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Operation voltage: 2.2V~3.6V
- ◆ Temperature range: -40°C~+85°C
- ◆ 24-bit ultra low noise $\Sigma\Delta$ ADC (output rate: 3.8sps~31.25Ksps, 90nVrms @15sps)
- ◆ Built-in temperature sensor
- ◆ Multi-Function Comparator for 16 level LVD, touch keys circuit and R/C sensor measurement
- ◆ 2% high speed (2M/4M/7.6MHz) RC Oscillator & low power low speed (11.5KHz) RC Oscillator
- ◆ Support 32768Hz external Crystal Oscillator driver
- ◆ PWM: 16-bit x1, 8-bit x2
- ◆ Support 2.75V Low voltage built-in EPROM (LVBIE) 64 words
- ◆ Max. 4x20 LCD driver
- ◆ Support EUART interface
- ◆ Support touch key function



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	Built-in EPROM (word)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	Touch Key	RTC	LCD (com x seg)	I/O	Timer		PWM (bit x ch.)	Serial Interface	Package
														8-bit	16-bit			
HY13P53B	2.2~3.6	11.5K 2M 4M 7.6M	11.5K~7.6M	4K	256	64, LV	20-bit x5	15~31.25K	Y	8-CH	Y	4x20	17	1	1	8-bit x2, 16-bit x1	EUART	LQFP64

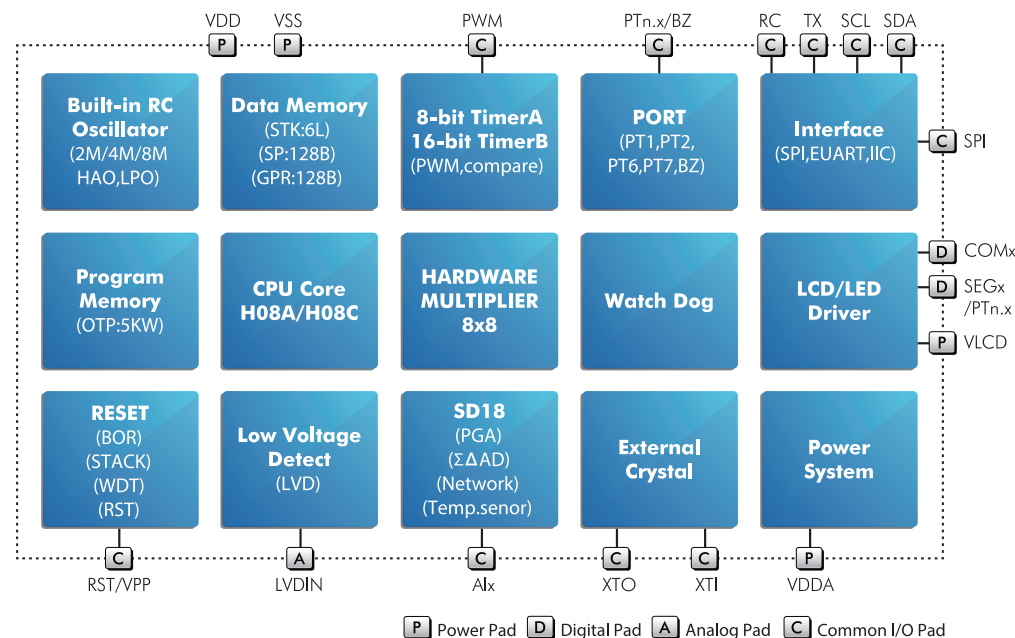
ADC : 24-bit Sigma Delta ADC.
TPS : Internal temperature sensor.

RTC : Support external 32768Hz crystal oscillator only.
Timer : Timer A(8-bit) support multi-segment interrupt time setting; Timer B (16-bit) support Capture/Compare function.

8-bit MCU (OTP Type)

HY15P Series (Σ ADC) Main Features

- ◆ Operation voltage: 2.2V~5.5V
- ◆ Temperature range: -40°C~+85°C
- ◆ 24-bit ultra low noise Σ ADC (output rate: 7.6sps~7.8Ksps, 120nVrms @7.6sps)
- ◆ Built-in temperature sensor
- ◆ 2% high speed (2M/4M/8MHz) RC Oscillator & low power low speed (14.5KHz) RC Oscillator
- ◆ Support 32768Hz external Crystal Oscillator Driver (HY15P53/43 only)
- ◆ PWM: 16-bit x1, 8-bit x2
- ◆ Support low voltage built-in EPROM 64 words
- ◆ Support EUART/SPI/I²C (Master and Slave two communication modes) interface



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	Built-in EPROM (word)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	RTC	LCD/LED (com x seg)	I/O	Timer		PWM (bit x ch.)	Serial Interface	Package
													8-bit	16-bit			
HY15P41*	2.2~5.5	14.5K 2M 4M 8M	14.5K~8M	2K	128	64	18-bit x5	15~7.8K	Y	-	-	1x1+5x1O	1	1	8-bit x2, 16-bit x1	EUART I ² C	DFN12 SOP8 SOP16
HY15P43	2.2~5.5	14.5K 2M 4M	14.5K~4M	5K	128	64 LV	18-bit x3	8~7.8K	Y	Y	7x7 LED	6x1O+10xO	1	1	8-bit x1	EUART	TSSOP28
											8x8 LED	10x1O+12xO			8-bit x2, 16-bit x1	EUART I ² C SPI	LQFP 48
HY15P53	2.2~5.5	14.5K 2M 4M	14.5K~4M	5K	128	64 LV	18-bit x3	8~7.8K	Y	Y	4x12 LCD 8x8 LED	12xO+10x1O	1	1	8-bit x2, 16-bit x1	EUART I ² C SPI	LQFP 48

ADC : 24-bit Sigma Delta ADC.
TPS : Internal temperature sensor.

RTC : Support external 32768Hz crystal or
1MHz~4MHz crystal oscillator.

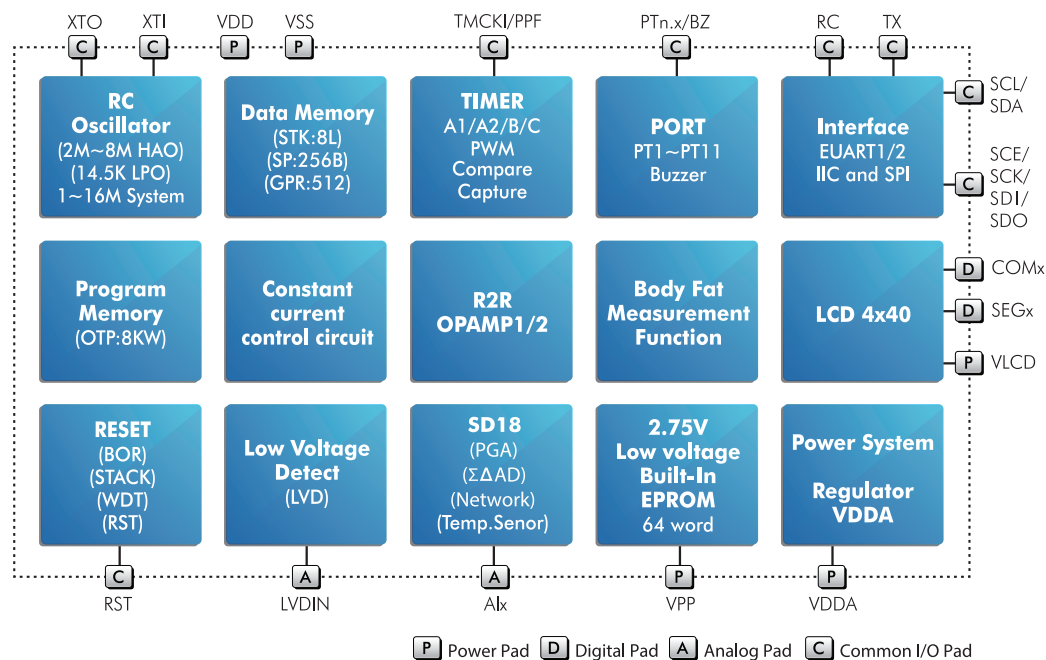
Timer : Timer A(8-bit) support multi-segment interrupt time
setting; Timer B (16-bit) support PWM function.

* : H08C instruction(the instruction is the same as H08A
but enhances the efficiency of C compilation)

8-bit MCU (OTP Type)

HY17P4x/5x Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Wide operation range : 2.2V~5.5V
- ◆ Wide temperature range : -40°C~85 °C
- ◆ 256 & 512 bytes SRAM, 4 & 8K words OTP memory
- ◆ Support low voltage built-in EPROM 64 words
- ◆ 2% high speed(2M/4M/8MHz) RC Oscillator & low power low speed(14.5kHz) RC Oscillator
- ◆ 24-bit ultra low noise $\Sigma\Delta$ ADC (output rate : 8sps~Max.
15.6Ksps, 65nVrms @ 8sps)
- ◆ Built-in Temperature Sensor, OPAMP & 8bit DAC (HY17P58 only)
- ◆ Built-in waveform generator can do impedance measurement (HY17P58 only)
- ◆ Support 2~15mA constant current for LED driving(HY17P48 only)
- ◆ Support UART/SPI/I²C(Master and Slave two communication modes) interface



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	Built-in EPROM (word)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	OPAMP (type x ch.)	DAC (bit x ch.)	RTC	LCD/LED (com x seg)	Constant current	Back Light	I/O	Timer		PWM (bit x ch.)	Serial Interface	Package
																	8-bit	16-bit			
HY17P48	2.2~5.5	14.5K 1.843M 3.686M 7.834M	14.5K~16M	8K	512	64LV	20-bit x8	8~15.6K	Y	-	-	Y	8x7LED	Y	-	14xIO +4xI	2	1	8-bit x2, 16-bit x1	EUARTx2 I ² Cx2 SPI	QFN32
			14.5K ~ 7.843M				20-bit x4					-				10xIO			8-bit x1, 16-bit x1	EUART I ² C SPI	SSOP28
HY17P51	2.0~5.5	14.5K 1.843M 3.686M 7.834M	14.5K~8M	4K	256	64LV	20-bit x4	8~7.1K	Y	-	-	-	-	-	-	8xIO	1	-	-	EUART	QFN16
													4x14LCD			6xIO +2xIO**					QFN32
HY17P52	2.2~5.5	14.5K 1.843M 3.686M 7.834M	14.5K~8M	4K	256	64LV	20-bit x4	8~15.6K	Y	-	-	-	4x14LCD	-	-	10xIO +2xIO**	1	-	-	EUART	LQFP48
HY17P55	2.2~5.5	14.5K 1.843M 3.686M 7.834M	14.5K~16M	4K	256	64LV	20-bit x4	8~7.1K	Y	-	-	Y	4x14LCD	-	-	12xIO +18xIO**	1	1	8-bit x2, 16-bit x1	EUART I ² C	LQFP48
HY17P56	2.2~5.5	14.5K 1.843M 3.686M 7.834M	14.5K~16M	8K	512	64LV	20-bit x4	8~7.1K	Y	-	-	Y	4x20LCD	-	-	12xIO +24xIO**	1	1	8-bit x2, 16-bit x1	EUARTx2 I ² C SPI	LQFP48
HY17P58*	2.2~5.5	14.5K 1.6M 3.2M 7.0M	14.5K~16M	8K	512	64LV	20-bit x12	8~15.6K	Y	R2Rx2 LNAx2	8bit x1	Y	4x40LCD	-	Y	8xI +16xIO +44xIO**	2	1	8-bit x2, 16-bit x1	EUARTx2 I ² C SPI	LQFP100

ADC: 24-bit Sigma Delta ADC.

OPAMP: R2R means Rail to Rail OPAMP, LNA means Low Noise OPAMP.

TPS: Internal Temperature Sensor.

RTC: Support external 32768Hz crystal or 450KHz~16MHz ceramic resonator or 1MHz~16MHz crystal oscillator.

DAC: Digital to Analog Converter.

Constant Current: 2~15mA constant current for LED driving.

Back Light: 2~3.8V constant voltage regulator circuit for backlight driving.

Timer: Timer A(8-bit) support multi-segment interrupt time setting; Timer B(16-bit) support Timer & PWM function, Timer C(16-bit) support Capture Compare function.

H08D: All HY17P Series products are H08D instruction architecture(the instruction is the same as H08A, but enhances the efficiency of C compilation)

* : In the HY17P series, only the PGA of the HY17P58 is R type, and the built-in waveform generator can do impedance measurement.

** : LCD pin shared I/O.

8-bit MCU (OTP Type)

HY17P6x Series (ΣΔADC) Main Features

- ◆ Wide operation range: 2.2V~5.5V and Wide temperature range : -40℃~85 ℃
- ◆ 8K/16K words OTP memory, 512/1024 bytes SRAM
- ◆ Support low voltage built-in EPROM 64+1024 words
- ◆ 2% high speed(4.9152M/9.8304MHz) RC Oscillator & low power low speed(14.5KHz) RC Oscillator
- ◆ Support 32768Hz & 1M~16MHz external Crystal Oscillator
- ◆ 24-bit ultra low noise ΣΔADC (output rate: 8sps~Max. 31.25Ksps)
- ◆ Built-in Temperature Sensor, LNA, Timer & PWM and Built-in 3 channel for 24-bit Frequency Counter
- ◆ Support AC RMS Bandwidth up to 4KHz and Support EUART/SPI/I²C(Master and Slave two communication modes) interface
- ◆ Built-in digital signal processing, programmable multi-function network, window comparator and other functions are used in 6000 counts digital RMS DMM products (HY17P68 only)

Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	Built-in EPROM (word)	ADC ENOB (bitxch.)	Sample Rate (sps)	TPS	OPAMP (typex ch.)	RTC	LCD (com x seg)	I/O		Timer	PWM (bitxch.)	Serial Interface	PA Network	PB Channel	Built-in CAP array	Freq. Counter (bitxch.)	Cap.	AC-RMS Bandwidth	Inrush Current	Peak Hold	Counts	Package
													8-bit	16-bit													
HY17P60B	2.2 ~ 5.5	14.5K ~ 4.9152M/9.8304M	14.5K ~ 16M	8K	512	64+1024* LV	19-bit x4	8~31.25K	Y	LNAx1	Y	-	9xIO + 6xIO**	1	1	8-bit x2, 16-bit x1	I ² C	-	4	-	24-bit x3	-	4kHz	-	-	2000	QFN32
												4x20	14xIO + 12xIO**				EUART I ² C										LQFP64
HY17P68	2.2 ~ 5.5	14.5K ~ 4.9152M/9.8304M	14.5K ~ 16M	16K	1024	64+1024* LV	19-bit x5	8~31.25K	Y	LNAx1	Y	4x15	19xIO + 15xIO**	1	1	8-bit x2, 16-bit x1	EUART SPI I ² C	7	5	Y	24-bit x3	50mF	4kHz	Y	<1mS	6000	LQFP64
							19-bit x8					4x35	27xIO + 36xIO**				I ² C	9	8								LQFP100

ADC: 24-bit Sigma Delta ADC.

LNA: Low Noise Operational Amplifier.

TPS: Internal Temperature Sensor.

RTC: Support external 32768Hz crystal or 450KHz~16MHz ceramic resonator or 1MHz~16MHz crystal oscillator.

DMM application: Freq. Counter, Capacitor array, AC-RMS Bandwidth, Inrush Current, Peak Hold and other functions are mainly used in DMM products.

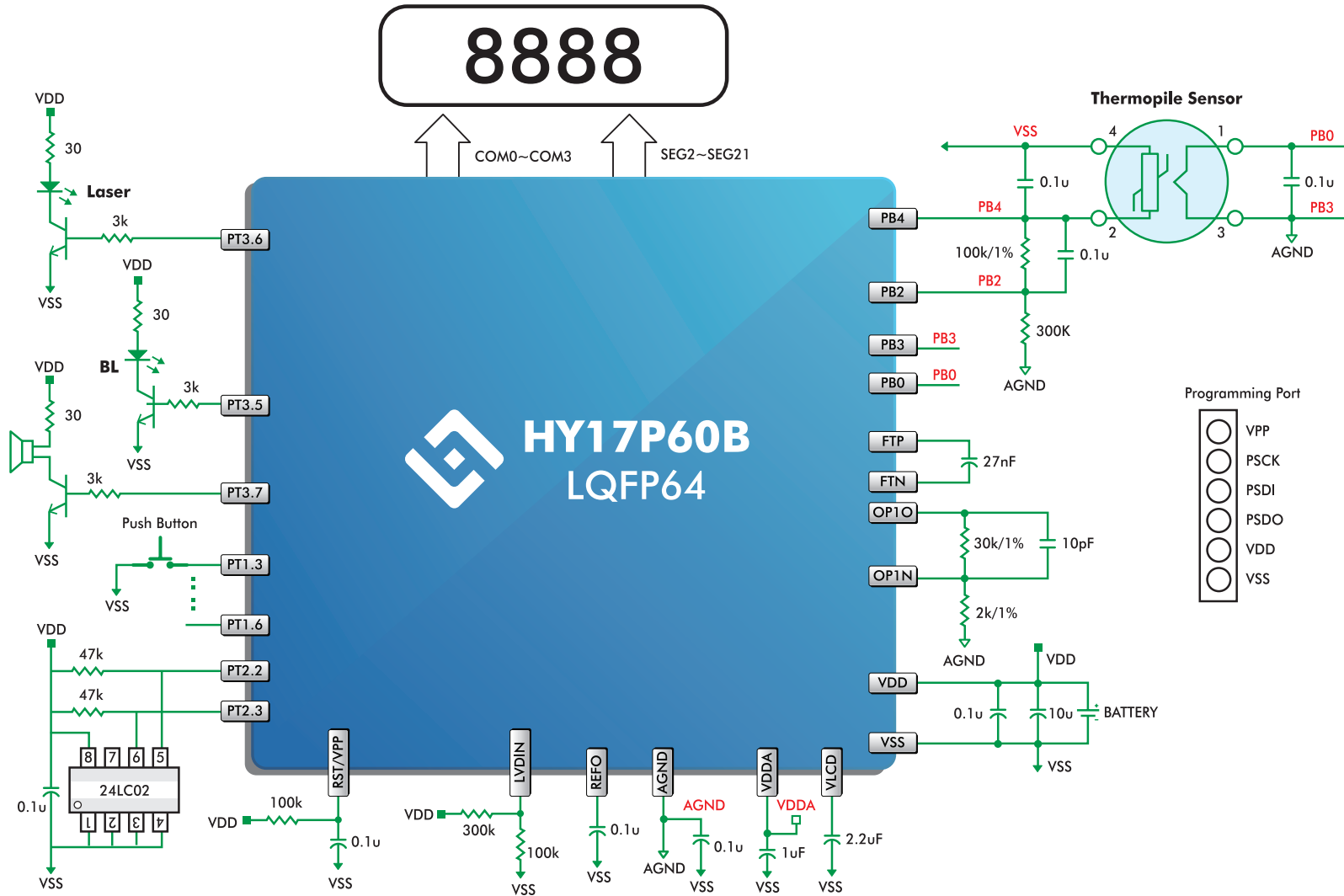
Timer: Timer A(8-bit) support multi-segment interrupt time setting; Timer B(16-bit) support Timer & PWM function.

H08D: The H08D instruction architecture(the instruction is the same as H08A, but enhances the efficiency of C compilation)

* : 1024 words BIE are shared by program memory.

** : LCD pin shared I/O.

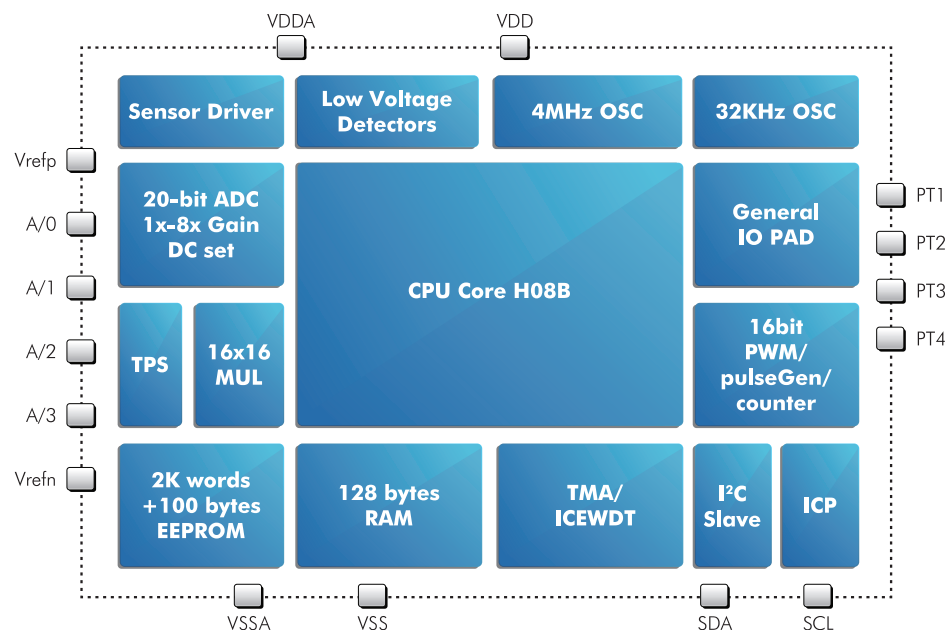




8-bit MCU (EEPROM Type)

HY14E Series (ΣADC) Main Features

- ◆ Wide operation range: 2.0V~5.5V
- ◆ Wide temperature range: -40°C~+125°C (HY14E10M only)
- ◆ 2% high speed(4MHz) RC Oscillator & low power low speed (32KHz) RC Oscillator
- ◆ Used as Integrated Piezo-resistive Pressure Sensors
 - * Integrate a 20-bit ADC for Voltage, and Temperature Measurements
- ◆ Integrate a 2K words EEPROM
 - * In system program circuit is embedded
 - * 100,000 program time
- ◆ 128 bytes SRAM
- ◆ 16x16b hardware multiplier
- ◆ Support I²C(Slave mode) interface
- ◆ Support 100 bytes of EEPROM to the user



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	I/O	Timer		PWM (bit x ch.)	Serial Interface	Operating Temperature	Package
										8-bit	16-bit				
HY14E10*	2.0~5.5	32K 4M	32K~4M	2K	128	19-bit x4	60~7.8K	Y	4	1	1	8-bit x2, 16-bit x1	I ² C Slave	-40°C~85°C	QFN16 SSOP16
HY14E10M*														-40°C~125°C	

ADC : 20-bit Sigma Delta ADC.

TPS : Internal temperature sensor.

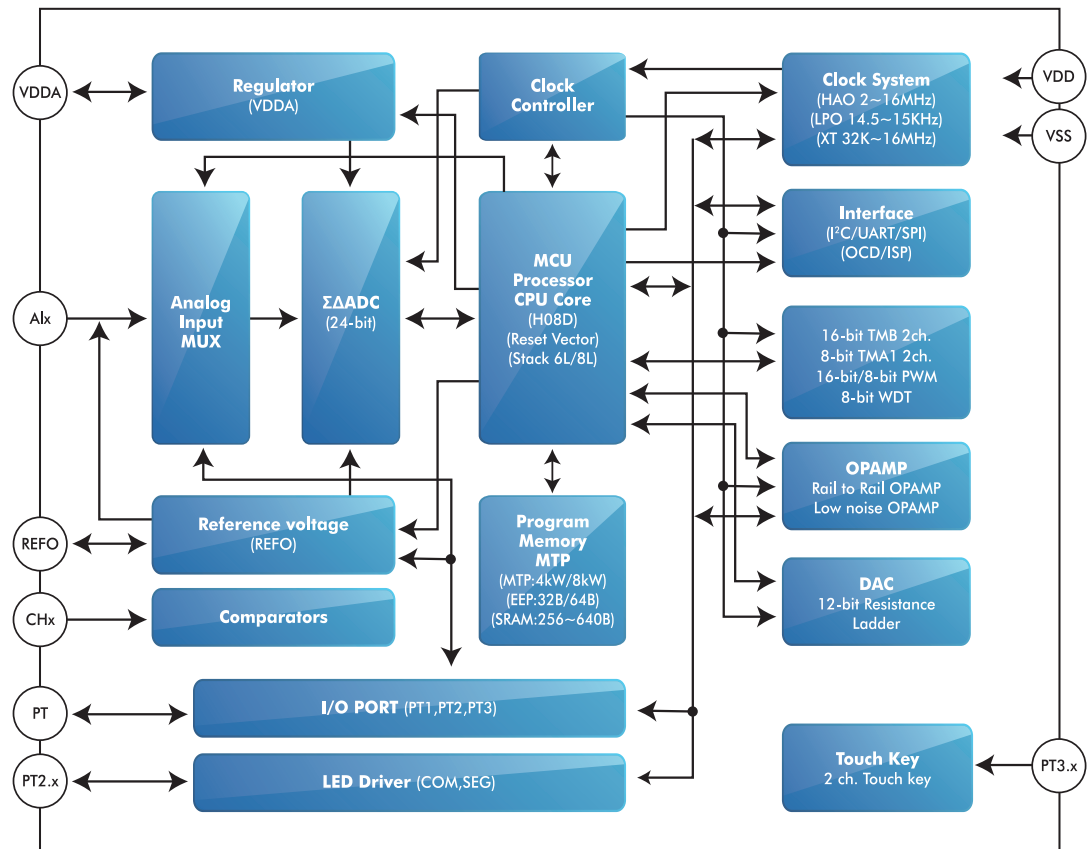
Timer : Timer A(8-bit) support multi-segment interrupt time setting; Timer B (16-bit) support PWM function.

* : H08B instruction, the main difference is that the instruction set does not contain 8x8 hardware multiplier, 16-bit table read instruction, conditional skip instruction and stack manipulation instructions.

8-bit MCU (MTP Type)

HY17M Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Wide operation range : 1.9V~5.5V
- ◆ Wide temperature range : -40°C~85 °C
- ◆ Sleep mode current : 0.1uA~0.25uA@VDD=3.0V
- ◆ 4K/8K words MTP memory (100 cycles)
- ◆ 32 bytes (3000 or 1500 cycles) & 64 bytes (700 cycles) EEPROM
- ◆ 2% high speed (2M/4M/8/16MHz) RC Oscillator & low power low speed (14.5kHz) RC Oscillator
- ◆ 24-bit ultra low noise $\Sigma\Delta$ ADC (output rate : 8sps~15.6Ksps, 150nVrms @ 8sps)
- ◆ Built-in Temperature Sensor, OPAMP & 12bit DAC
- ◆ PWM: 16-bit x 1~2, 8-bit x 2~4
- ◆ Support EUART/I²C (Master and Slave two communication modes) & SPI interface
- ◆ Support On-Chip-Debug (OCD) & In-Circuit-Programming (ICP) function
- ◆ Support ISP (In-System Programming) function (HY17M26 & HY17M28 only).
- ◆ Support 2 Touch Key (HY17M28 only)
- ◆ Support 2~15mA constant current for LED driving (HY17M28 only)



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Program Memory (word)	Data Memory (byte)	Built-in EPROM (word)	Built-in EEPROM (Byte)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	OPAMP (type x ch.)	DAC (bit x ch.)	RTC	LCD/LED (com x seg)	I/O	Timer		PWM (bit x ch.)	Serial Interface	ISP	Package
																8-bit	16-bit				
HY17M24	1.9~5.5	14.5K 1.843M 4.147M 8.755M 17.51M	14.5K~16M	4K*	256	-	32**	21-bit x11	8~15.6K	Y	R2Rx1	12bit x1	Y	-	9xIO	1	1	8-bit x2, 16-bit x1	EUART I ² C	-	SOP16
								21-bit x15							17xIO						SSOP24 QFN24 SSOP28
HY17M26	1.9~5.5	14.5K 1.843M 4.147M 8.755M 17.51M	14.5K~16M	8K*	640	128***	-	21-bit x10	8~15.6K	Y	-	-	Y	-	9xIO	2	2	8-bit x4, 16-bit x2	EUARTx2 I ² Cx2 SPIx1	Y	SSOP16
								21-bit x18							21xIO						SSOP28
								21-bit x18							23xIO						QFN32
HY17M28	1.9~5.5	14.5K 1.843M 4.147M 8.755M 15.667M	14.5K~16M	8K*	512	-	32~ 64**	20-bit x7	8~15.6K	Y	LNAx1	-	Y	8x7 LED	15xIO	1	1	8-bit x2, 16-bit x1	EUART I ² C	Y	SSOP20
								20-bit x11							19xIO						SSOP28
								20-bit x14							23xIO						QFN32

ADC: 24-bit Sigma Delta ADC.

OPAMP: R2R means Rail to Rail OPAMP, LNA means Low Noise OPAMP.

TPS: Internal Temperature Sensor.

RTC: Support external 32768Hz crystal or 450KHz~16MHz ceramic resonator or 1MHz~16MHz crystal oscillator.

DAC: Digital to Analog Converter.

ISP: Support hardware In System Programming (ISP), which can be completed through UART communication interface.

Timer: Timer A (16-bit) support multi-segment interrupt time setting; Timer B (16-bit) with PWM function,
PWM output can choose 8-bit or 16-bit design; Timer C (16-bit) with Compare and Capture function.

H08D: All HY17M Series products are H08D instruction architecture (the instruction is the same as H08A, but enhances the efficiency of C compilation)

* : MTP Program Memory's Write/Erase cycle time is 100 cycles.

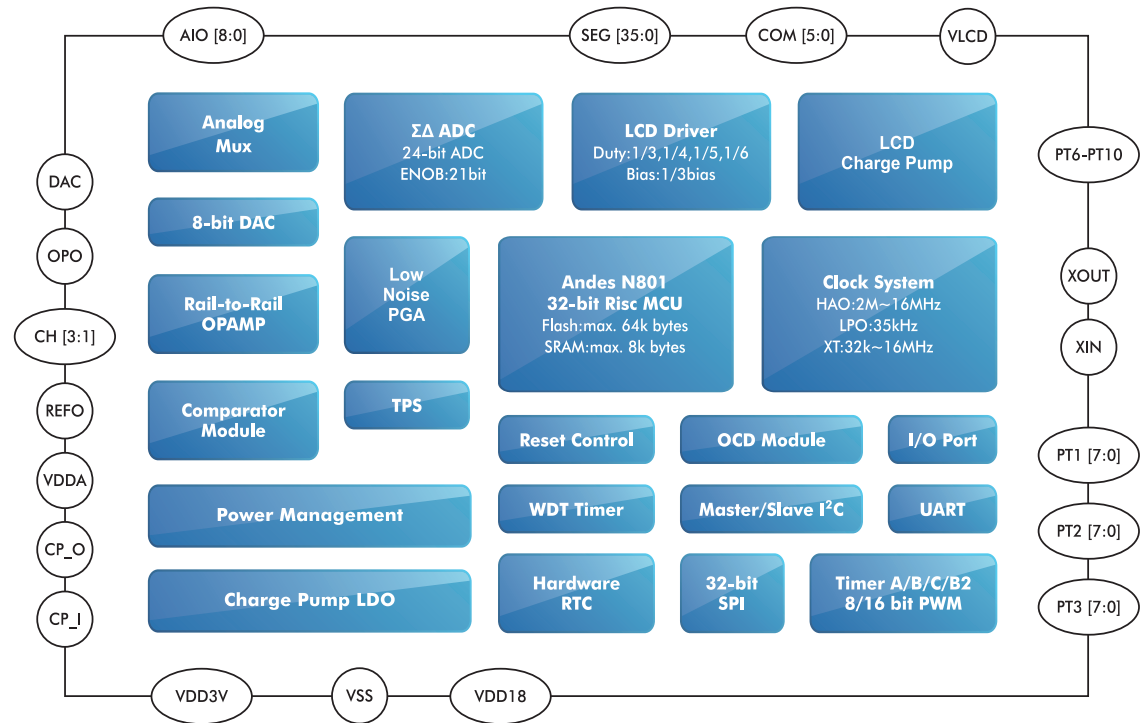
** : 32B/64B/128B EEPROM Data Memory space sizes support different Write/Erase cycle times, please refer to the product specification for details.

*** : EPROM Data Memory's Write/Erase cycle time is 100 cycles and please note that every time you need to write the value, you must erase the 128 words again.

32-bit MCU (Flash Type)

HY16F18/19 Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Operation voltage: 2.2V~3.6V
- ◆ Temperature range: -40°C~+85°C
- ◆ 24-bit ultra low noise $\Sigma\Delta$ ADC (output rate: 10sps~10Ksps, 65nVrms @10sps for HY16F19xB series)
- ◆ Built-in temperature sensor
- ◆ Multi-Function Comparator for 16-level LVD
- ◆ Built-in OPAMP, DAC, Charge Pump, hardware RTC
- ◆ 2% high speed RC Oscillator & low power speed RC Oscillator
- ◆ Support 32768Hz & 1MHz~16MHz external Crystal Oscillator driver
- ◆ PWM: max. 16-bit x2, max. 8-bit x4
- ◆ Support EUART/32-bit SPI/I²C (Master and Slave two communication modes) interface
- ◆ Support OCD(On-Chip Debug) function



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Flash Memory (byte)	Data Memory (byte)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	OPAMP (type x ch.)	DAC (bit x ch.)	Charge pump	RTC	LCD (com x seg)	I/O	Timer		PWM (bit x ch.)	Serial Interface	ISP	Package
															8-bit	16-bit				
HY16F184	2.2~3.6	35K 2M 4M 10M	32K~ 16M	16K	2K	21-bit x4	10~10K	Y	R2Rx1	8bit x1	-	Y	-	17	-	2	8-bit x2, 16-bit x1	EUART I ² C 32b SPI	-	TSSOP28
						21-bit x (4+4*)								20						LQFP48 QFN33
HY16F187	2.2~3.6	35K 2M 4M 10M	32K~ 16M	32K	4K	21-bit x4	10~10K	Y	R2Rx1	8bit x1	-	Y	-	20	-	2	8-bit x2, 16-bit x1	EUART I ² C 32b SPI	-	LQFP48 QFN33
HY16F188	2.2~3.6	35K 2M 4M 10M	32K~ 16M	64K	8K	21-bit x4	10~10K	Y	R2Rx1	8bit x1	Y	Y	-	24	-	2	8-bit x2, 16-bit x1	EUART I ² C 32b SPI	-	LQFP48
HY16F196B	2.2~3.6	35K 2M 4M 10M 16M	32K~ 16M	16K	2K	21-bit x8	10~10K	Y	R2Rx1	8bit x1	Y	Y	4x24 or 6x22	20+22**	-	3	8-bit x4, 16-bit x2	EUART x2 I ² C 32b SPI	Y	LQFP64
													4x28 or 6x26	20+26**						QFN68
HY16F197B	2.2~3.6	35K 2M 4M 10M 16M	32K~ 16M	32K	4K	21-bit x5	10~10K	Y	R2Rx1	8bit x1	Y	Y	4x26 or 6x24	20+24**	-	3	8-bit x4, 16-bit x2	EUART x2 I ² C 32b SPI	Y	LQFP64
													4x30 or 6x28	20+28**						QFN68
HY16F198B	2.2~3.6	35K 2M 4M 10M 16M	32K~ 16M	64K	8K	21-bit x6	10~10K	Y	R2Rx1	8bit x1	N	Y	4x26 or 6x24	24+24**	-	3	8-bit x4, 16-bit x2	EUART x2 I ² C 32b SPI	Y	LQFP64
						21-bit x8					Y		4x36 or 6x34	24+34**						LQFP80 LQFP100 QFN88

ADC : 24-bit Sigma Delta ADC.

OPAMP: R2R means Rail to Rail OPAMP.

TPS : Internal temperature sensor.

RTC : Support external 32768Hz crystal oscillator and hardware RTC(Real Time Clock) and calendar function.

ISP : Support hardware In System Programming(ISP), which can be completed through UART communication interface.

Timer : Timer A(16-bit) support multi-segment interrupt time setting; Timer B(16-bit) support PWM function, PWM output can be selected as 8-bit or 16-bit; Timer C (16-bit) support Capture Compare function.

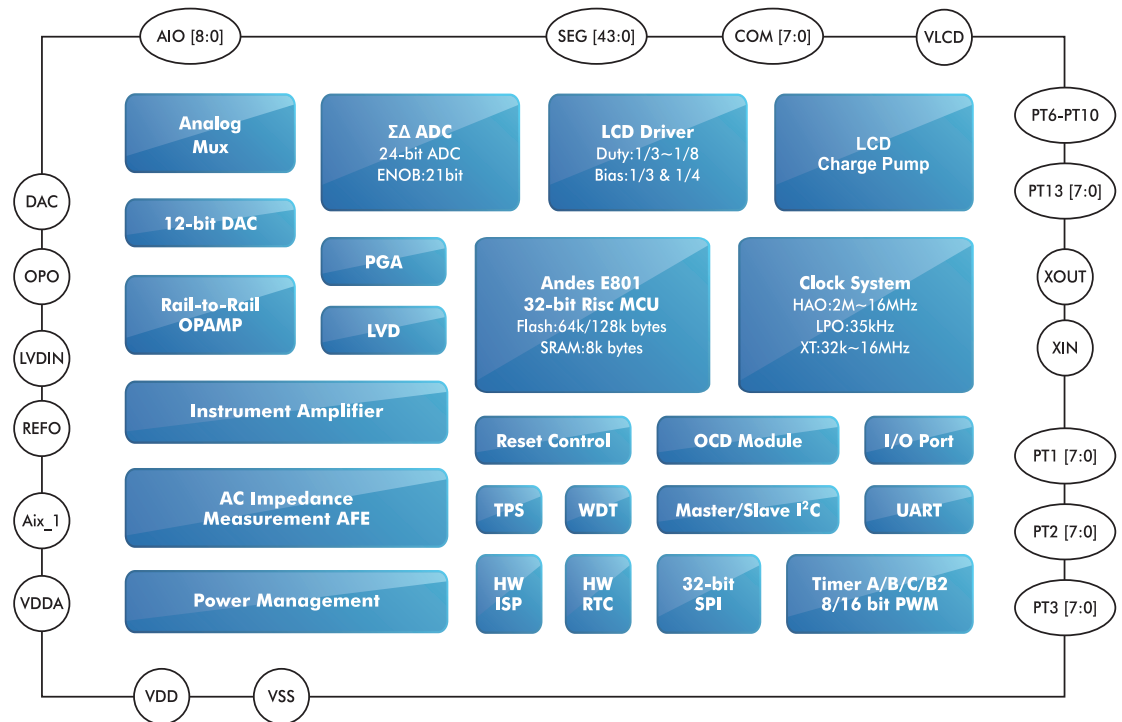
* : Through the multiplexer switch can be used as analog input channels.

** : LCD pin shared I/O.

32-bit MCU (Flash Type)

HY16F39 Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Wide operation range: 2.2V~3.6V(For HY16F3981) & 2.0V~5.5V(For HY16F391x)
- ◆ Wide temperature range: -40°C~85°C
- ◆ 64K/128K bytes flash memory, 8K bytes SRAM
- ◆ Support high speed (accuracy up to $\pm 1\%$ @25°C after trim) & low power low speed RC Oscillator
- ◆ Support 32768Hz & 1M~16MHz external Crystal Oscillator
- ◆ Built-in 24-bit ultra low noise $\Sigma \Delta$ ADC (output rate: 31~15Ksps, 65nVrms@31sps for HY16F391x)
- ◆ Built-in RTC, LNA, DAC, Timer, GPIO, PWM & LCD driver and other hardware peripheral functions
- ◆ Built-in Instrumentation Amplifier hardware (HY16F3981 only)
- ◆ Built-in AFE of AC impedance measurement and electrochemical analysis (HY16F3913 only)
- ◆ Support EUART/32-bit SPI/I2C(Master and Slave two communication modes) interface
- ◆ Support OCD(On-Chip Debug) & ISP (In-System Programming) functions



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	Flash Memory (byte)	Data Memory (byte)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	OPAMP (type x ch.)	DAC (bit x ch.)	RTC	LCD (com x seg)	I/O	Timer		PWM (bit x ch.)	Serial Interface	ISP	Special Function	Package
														8-bit	16-bit					
HY16F3981	2.2~3.6	35K 1.843M 4.147M 9.216M 15.667M	32K~16M	64K	8K	21-bit x7	31~15K	Y	R2Rx1	12bit x1	Y	-	15	-	3	8-bit x4, 16-bit x2	EUSART x2 I ² C 32b SPI	Y	IA*	SSOP28
												4x32 or 6x30	14+36**	-	3					LQFP64
HY16F3910	2.0~5.5	32K 4.147M 31.795M	32K~32M	128K	8K	20-bit x9	31~15K	Y	-	-	Y	4x26 or 6x24 or 8x22	24+30**	-	3	8-bit x4, 16-bit x2	EUSART x2 I ² C 32b SPI	Y	-	LQFP64
												4x40 or 6x38 or 8x36	24+44**							LQFP80
												4x44 or 6x42 or 8x40	24+48**							QFN88
HY16F3913	2.0~5.5	32K 4.147M 31.795M	32K~32M	128K	8K	20-bit x9	31~15K	Y	R2Rx3	12bit x2	Y	4x44 or 6x42 or 8x40	22+48**	-	3	8-bit x4, 16-bit x2	EUSART x2 I ² C 32b SPI	Y	AC*** Impedance	LQFP100
						20-bit x5						4x34 or 6x32 or 8x30	24+38**							QFN88

ADC: 24-bit Sigma Delta ADC.

OPAMP: R2R means Rail to Rail OPAMP, LNA means Low Noise OPAMP.

TPS: Internal Temperature Sensor.

RTC: Support hardware Real Time Clock(RTC) function, which can achieve the functions of year, month, day, hour, minute, second and alarm.

DAC: Digital to Analog Converter.

ISP: Support hardware In System Programming(ISP), which can be completed through UART communication interface.

Timer: Timer A(8-bit) support multi-segment interrupt time setting; Timer B (16-bit) with PWM function, PWM output can choose 8-bit or 16-bit design; Timer C (16-bit) with Compare and Capture function.
IA* : Built-In Instrumentation Amplifier(IA).

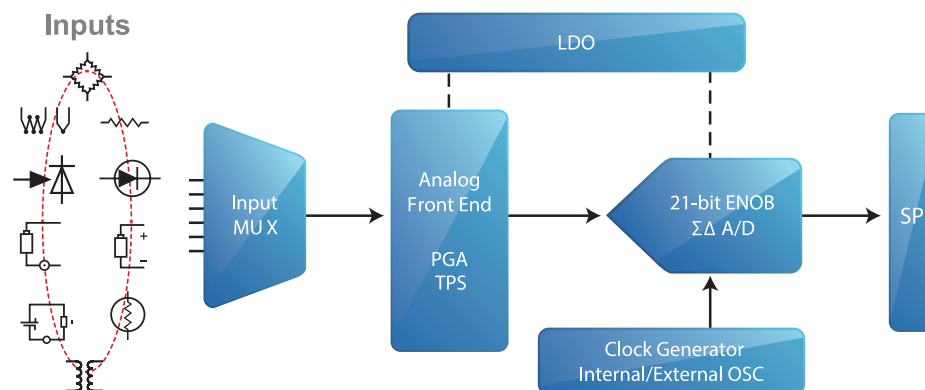
** : LCD pin shared I/O.

AC*** : Built-in Analog Front-End(AFE), which can achieve the functions of AC impedance measurement and electrochemical analysis.

Data Converters

HY310x Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Operation voltage: 2.4V~3.6V
- ◆ Temperature range: -40°C~+85°C
- ◆ Built-in VDDA regulator, 2.4V, 2.7V, 3.0V and 3.3V voltage selection
- ◆ Built-in temperature sensor with $\pm 2^\circ\text{C}$ accuracy
- ◆ Up to 4 analog channels
- ◆ 24-bit fully differential $\Sigma\Delta$ Analog-to-Digital Converter (ADC)
 - * Lowest RMS noise level: 50nV@10sps
 - * Output rate, 10, 80, 640 and 2560sps selection
 - * 50/60Hz signal rejection
 - * Reference input buffer
- ◆ Operation current:
 - * 950 μA @ gain=64, 128
 - * 300 μA @ gain=1, 2 or 4
- ◆ Built-in PGA, x1, x2, x4... x128 gain amplification



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	ADC ENOB (bit x ch.)	ADC Gain	PGA Gain	Sample Rate (sps)	RMS Noise	TPS	External Crystal (Hz)	Serial Interface	Package
HY3102	2.4~3.6	327K	320K	21-bit x2	1~4	8~32	10~2560	50nV (10sps)	Y	-	SPI	SSOP 16
HY3106	2.4~3.6	327K	327K~4.9152M	21-bit x4	1~4	8~32	10~2560	50nV (10sps)	Y	4.9152M	SPI	SSOP 16

ADC : 24-bit Sigma Delta ADC.
 ADC Gain : Gain magnification of ADC.

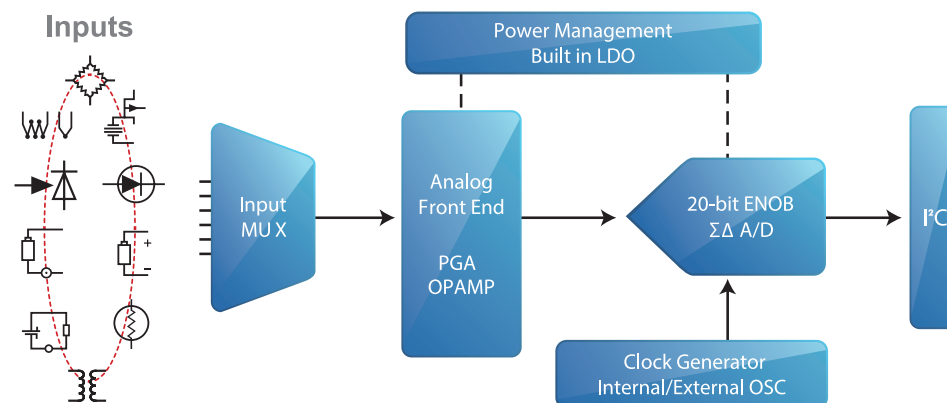
PGA Gain : Gain magnification of PGA(programmable gain amplifier).
 RMS Noise : ADC input RMS Noise voltage (test conditions: Gain= 128, Output Rate= 10sps).

External Crystal: Support 4.9152MHz High Speed crystal oscillator.

Data Converters

HY311x Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Operation voltage: 2.4V~3.6V
- ◆ Temperature range: -40°C~+85°C
- ◆ Built-in VDDA regulator, 2.4V, 2.7V, 3.0V and 3.3V voltage selection
- ◆ Built-in Rail-to-Rail OPAMP
- ◆ Operation current:
 - * Full speed: 1050 μ A (OPAMP excluded)
 - * Sleep current: 1 μ A
- ◆ 24-bit fully differential $\Sigma\Delta$ Analog-to-Digital Converter (ADC)
 - * Built-in PGA, x1, x2, x4...x128 gain amplification
 - * Lowest RMS noise level: 100nV@10sps
 - * Output rate up to 7680sps
 - * 50/60Hz signal rejection
 - * Symmetric analog input network
 - * Up to 4 analog channels
 - * Built-in 4-bit DC bias voltage
 - * Built-in high impedance input buffer at reference end



Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	ADC ENOB (bit x ch.)	ADC Gain	PGA Gain	Sample Rate (sps)	RMS Noise	OPAMP (type x ch.)	External Crystal (Hz)	Serial Interface	Package
HY3116	2.4~3.6	327K 1M	327K~1M	21-bit x2	1~4	8~32	10~7680	100nV (10sps)	-	-	I²C Slave	MSOP 10
HY3118	2.4~3.6	327K 1M	327K~4.9152M	21-bit x4	1~4	8~32	10~7680	100nV (10sps)	R2Rx1	4.9152M	I²C Slave	SSOP 16

ADC : 24-bit Sigma Delta ADC.

ADC Gain : Gain magnification of ADC.

PGA Gain : Gain magnification of PGA(programmable gain amplifier).

RMS Noise : ADC input RMS Noise voltage (test conditions: Gain= 128, Output Rate= 10sps).

OPAMP : R2R (Rail-to-Rail Amplifier).

External Crystal: Support 4.9152MHz High Speed crystal oscillator.

Analog Front End for AC Impedance Measurement

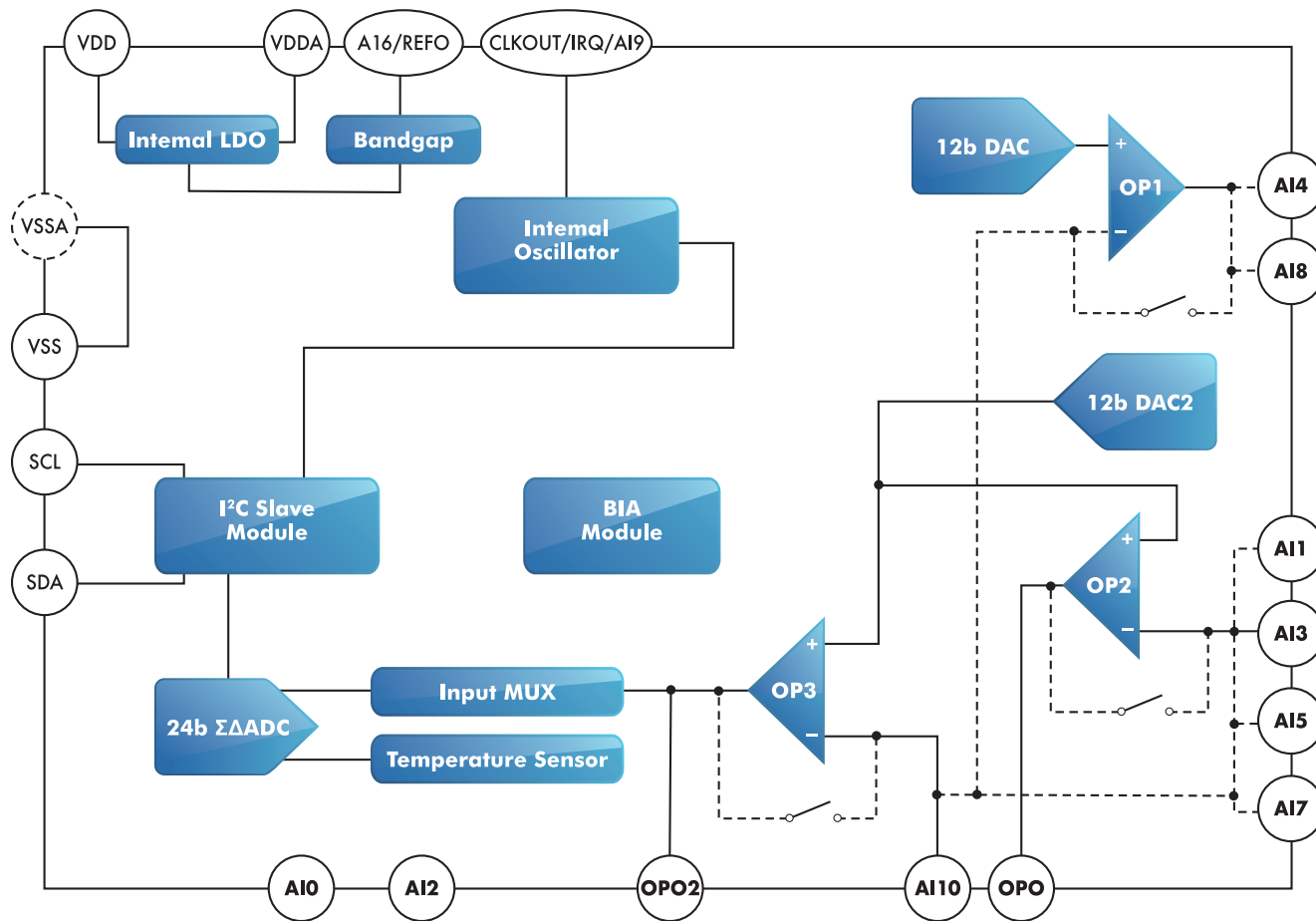
HY3123 Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Wide operation range: 2.2V~5.5V
- ◆ Wide temperature range: -40°C~+85° C
- ◆ Built-in VDDA regulator, eight-stage voltage can be selected from 2.2V to 3.6V
- ◆ Built-in 3 channels Rail-to rail OPAMP and 2 channels 12-bit DAC
- ◆ 24-bits fully differential $\Sigma\Delta$ ADC (Analog-to-Digital Converter) with 1MHz
 - * Optional gains of: $\times 1/4$, $\times 1/2$, $\times 1 \sim \times 16$ and Output rates up to 31.25Ksps
 - * Built-in TPS temperature sensor
- ◆ Support I²C slave communication mode interface
- ◆ Support IRQ/Sleep and frequency output function
- ◆ Bioelectrical Impedance Analysis Module (BIA Module)
 - * Electrochemical analysis
 - * Bioelectrical impedance analysis
 - * AC waveform frequency: 122Hz~250KHz
 - * Impedence Range: 1K~1M Ω
 - * Phase detector: 0~90°

Model No.	VDD (V)	Internal Clock (Hz)	System Clock (Hz)	ADC ENOB (bit x ch.)	Sample Rate (sps)	TPS	OPAMP (type x ch.)	DAC (bit x ch.)	BIA Module	IQR Function	Serial Interface	Package
HY3123	2.2 ~ 5.5	2M	2M ~ 8M	19-bit x11	8 ~ 31.25k	Y	R2R x3	12-bit x2	Y	Y	I ² C	SSOP 16 SSOP 20
		4M										
		8M										

ADC : 24-bit Sigma Delta ADC.
 TPS: Internal Temperature Sensor.
 OPAMP: R2R means Rail to Rail Amplifier.

DAC: Digital to Analog Converter.
 BIA Module: It can generate AC waveform and measure the impedance and angle of the object to be measured.
 IRQ Function: When the ADC is interrupted, the IRQ interrupt signal can be output through the CLKOUT pin or the SDA pin.



Analog Front End for DMM

HY313x Series ($\Sigma\Delta$ ADC) Main Features

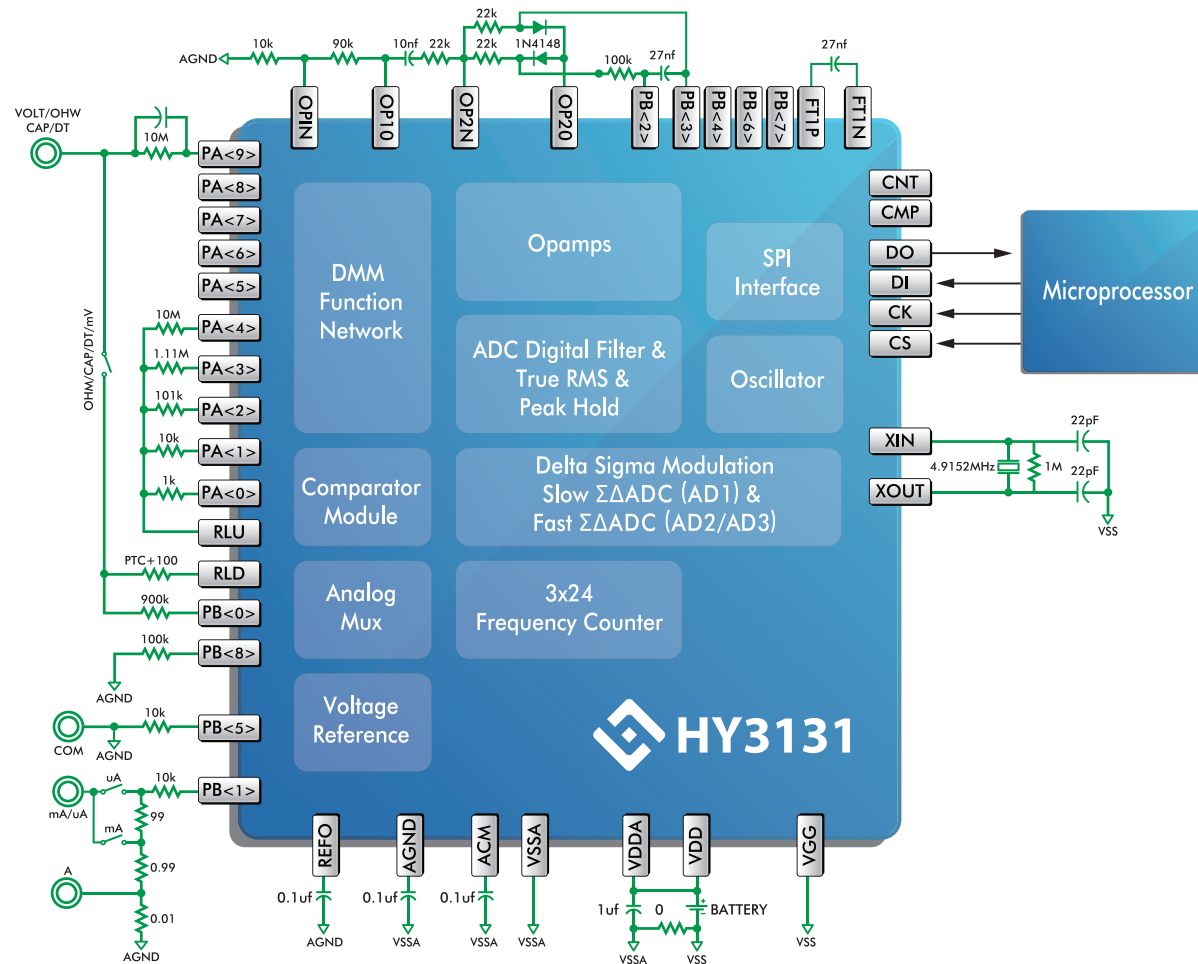
- ◆ High resolution and high speed $\Sigma\Delta$ ADC to achieve digital T-RMS, peak hold & inrush current functions
- ◆ Flexible auto range multifunctional network for reference resistor ratio self-calibration
- ◆ Programmable capacitors array for ACV bandwidth compensation
- ◆ Programmable $\pm$ constant voltage/current source
- ◆ Dual multifunctional comparators with programmable comparison voltage for continuity test, capacitance and frequency measurements
- ◆ 3 sets of 24-bit programmable counters for frequency and duty cycle measurement

Model No.	VDD (V)	System Clock (Hz)	High Precision ADC	Sample Rate (sps)	High Speed ADC	Sample Rate (KHz)	TPS	PA Network	PB Channel	Built-in Cap. Array	OPAMP (type x ch.)	Cap. (mF)	T-RMS Bandwidth (KHz)	Inrush Current	Peak Hold (ms)	Counts	External Crystal (Hz)	Serial Interface	Package
HY3130	3.6	4.9152M	1	5~640	1	1.2~76.8	Y	10	9	Y	LNAx2	50	8	Y	0.1	5,000	4.9152M	SPI	LQFP48
HY3131	3.6	4.9152M	1	5~640	2	1.2~76.8	Y	10	9	Y	LNAx2	50	8	Y	0.1	50,000	4.9152M	SPI	LQFP48

ADC : 24-bit Sigma Delta ADC.

TPS : Internal temperature sensor.

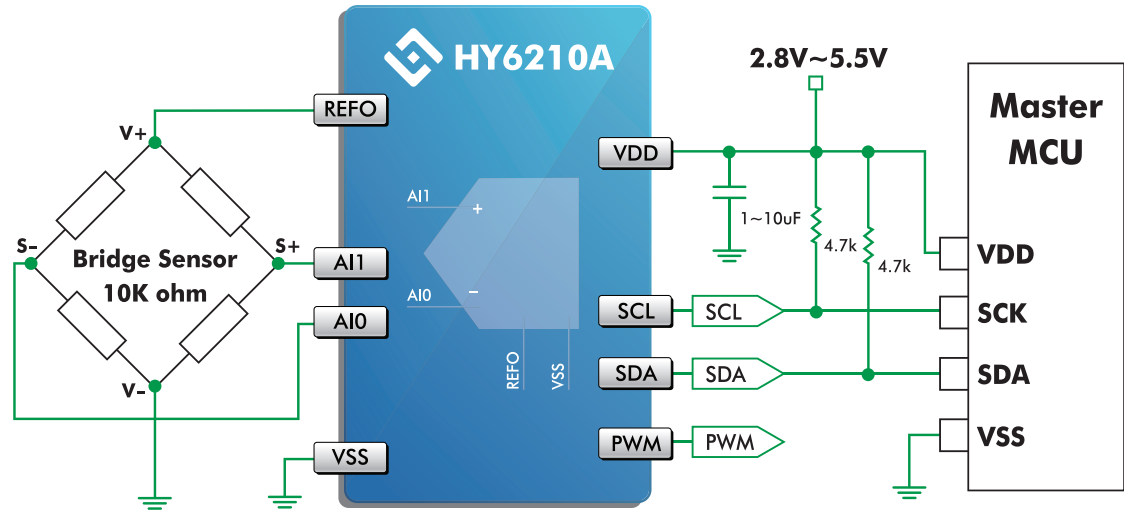
External Crystal: Support 4.9152MHz High Speed crystal oscillator.



Sensor Signal Conditioners (SSC)

HY6210 Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Wide operation range: 2.8V~5.5V
- ◆ Wide temperature range: -40°C~85°C
- ◆ Very low sleep current (0.1uA @ 25°C/VDD=3V)
- ◆ The sampling current can be set to a minimum of 19uA through the register
- ◆ The fastest output speed of the digital pressure signal is 15ms @OSR=128
- ◆ Programmable analog gain settings
- ◆ Offset, sensitivity, temperature drift and non-linearity of digitally compensated sensors
- ◆ Internal temperature measurement compensation sensor digital output and temperature output
- ◆ Built-in 128 bytes EEPROM Data Memory (cycle time is 100 cycles)
- ◆ Built-in fully differential signal input ENOB 20bit $\Sigma\Delta$ ADC
- ◆ Support I²C Slave communication mode interface and PWM output
- ◆ Support user password protection to prevent calibration data from being changed



Model No.	VDD (V)	Digital Core Clock Freq. (Hz)	Built-in EEPROM (Byte)	ADC ENOB (bit)	Pressure Sensor Gain Range	PFM Duty Range	PFM Freq. Range (Hz)	Sample Rate (sps)	Data Update	TPS	Serial Interface	Package
HY6210A	2.8~5.5	2M 4M 8M 16M	128*	20-bit	1/4~16	0% 10% 50% 100%	300~60K	15~7.8K	Yes**	Yes	I ² C PWM	Wafer Dice SOP8

ADC ENOB: Effective Number of Bits(ENOB) of Sigma Delta ADC.
TPS: Internal Temperature Sensor.

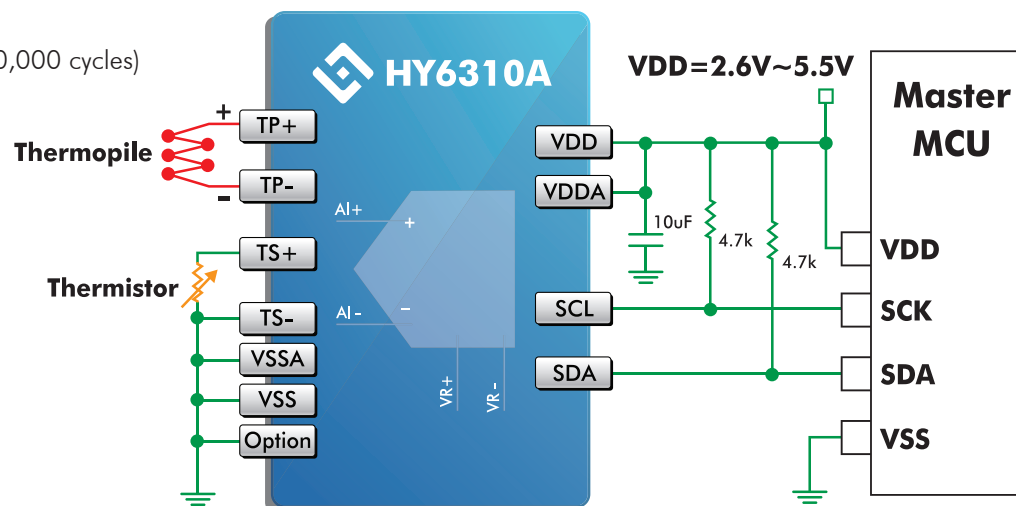
PFM: Pulse Frequency Modulation(PFM).
*: EEPROM Data Memory's Write/Erase cycle time is 100 cycles.

** : Data update speed is adjustable in 8 steps, divided into 0.23Hz, 0.47Hz, 0.95Hz, 1.88Hz, 3.75Hz, 7.50Hz, 15Hz and continuous mode.

Sensor Signal Conditioners (SSC)

HY6310 Series ($\Sigma\Delta$ ADC) Main Features

- ◆ Wide operation range: 2.6~5.5V
- ◆ Wide temperature range: -40°C~85°C
- ◆ Built-in 128 bytes EEPROM Data Memory (cycle time is 100,000 cycles)
- ◆ Chip sleep mode current (2 μ A@25°C/VDD=3V)
- ◆ Built-in high-precision 20-Bit Sigma delta ADC, ENOB can reach 16-bit
- ◆ The fastest output speed of the digital pressure signal is 7.8KHz@OSR=128
- ◆ Suitable for IR thermopile sensor applications: can be used for sensor offset, digital compensation for sensitivity, temperature drift and nonlinearity
- ◆ Settable signal sampling speed: adjustable 16-step speed (0.02Hz~2KHz)
- ◆ settable PGA gain: adjustable to 20, 40, 80 times
- ◆ Settable ADC gain: adjustable to 1, 2, 4 & 8 times
- ◆ Support I²C slave communication interface
- ◆ Digital Thermopile and Thermosister signals can be output through I²C communication interface



Model No.	VDD (V)	Digital Core Clock Freq. (Hz)	Built-in EEPROM (Byte)	ADC ENOB (bit)	ADC Gain Range	PGA Gain Range	Sample Rate (sps)	Data Update	TPS	Serial Interface	Package
HY6310A	2.6~5.5	7.86M	128*	16-bit	x1,x2,x4,x8	x20,x40,x80	61~7.8K	Yes**	Yes	I ² C	Wafer Dice QFN16 SSOP16

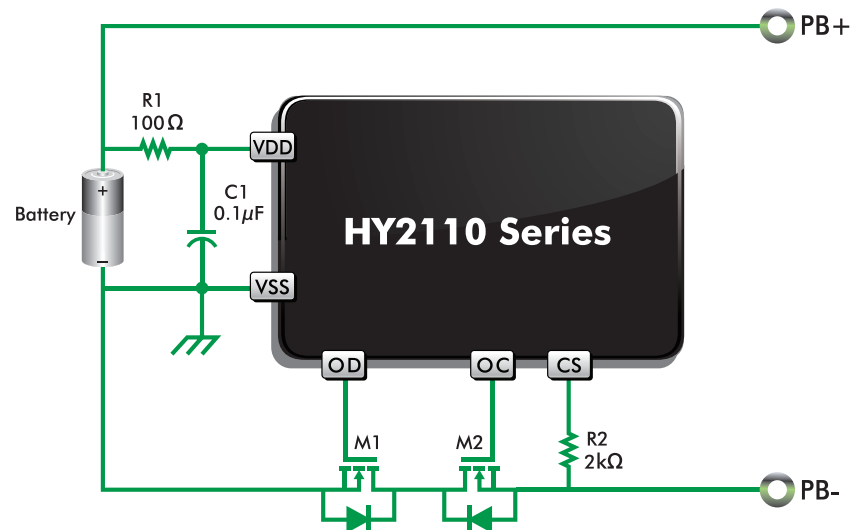
ADC ENOB: Effective Number of Bits(ENOB) of Sigma Delta ADC.
TPS: Internal Temperature Sensor.

* : EEPROM Data Memory's Write/Erase cycle time is 100,000 cycles.
** : Data update speed is adjustable in 16 steps, the range is 0.02Hz~2KHz.

Single Cell Primary Protectors

HY2110 Series Main Features

- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ $\pm 50\text{mV}$ accuracy of overcharge detection voltage
- ◆ Low current consumption:
 - * Operation mode $< 6\mu\text{A}$ ($\text{VDD}=3.9\text{V}$)
 - * Auto Recovery Overdischarge mode $< 6\mu\text{A}$
 - * Power Down mode $< 0.1\mu\text{A}$ ($\text{VDD}=2.0\text{V}$)
- ◆ Charger connected pin adopts high-withstand-voltage design (CS/OC pin absolute max. rating: 20V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Package: SOT-23-6
- ◆ Wide operation temperature range: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- ◆ All products are in Green packages: Pb & Halogen-free



SOT-23-6

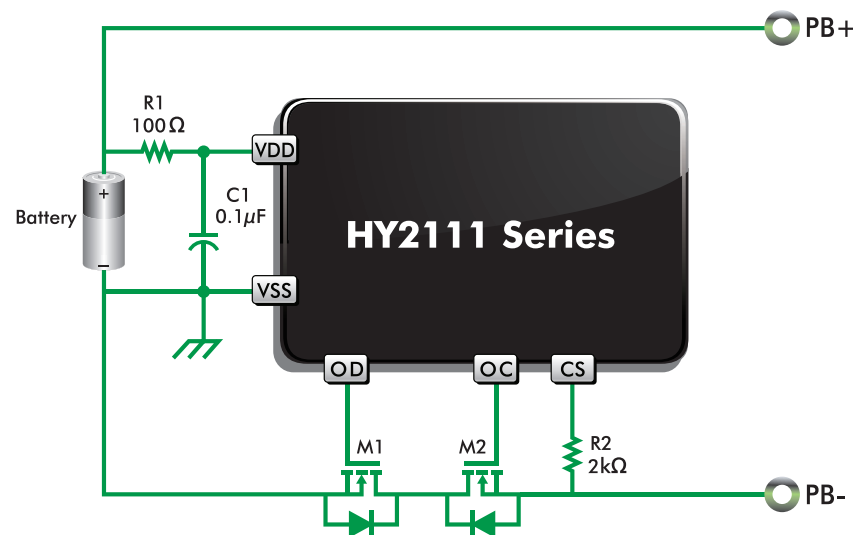
Model No.	Overcharge Detection Voltage	Overcharge Release Voltage	Overdischarge Detection Voltage	Overdischarge Release Voltage	Discharge Overcurrent Detection Voltage	Charger Detection Voltage	Short Circuit Detection Voltage	OV Battery Charge Function	Power-down Function/ Auto Overdischarge Recovery Function	Overcharge Detection Delay Time	Overdischarge Detection Delay Time	Discharge Overcurrent Detection Delay Time	Charge Overcurrent Detection Delay Time	Load Short Circuiting Detection Delay Time	Over-charge release mode
	VCU	VCR	VDL	VDR	VDIP	VCHA	VSIP	VOCH	Notice(1)	TOC	TOD	TDIP	TCIP	TSIP	
HY2110-GB	4.280 V	4.080 V	2.500 V	3.000 V	150 mV	-150 mV	0.85 V	Available	P	100 ms	25 ms	10 ms	12 ms	500 μs	Available
HY2110-HB	4.280 V	4.080 V	2.500 V	3.000 V	150 mV	-150 mV	0.85 V	Available	A	100 ms	25 ms	10 ms	12 ms	500 μs	Available

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Single Cell Primary Protectors

HY2111 Series Main Features

- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ $\pm 25\text{mV}$ accuracy of overcharge detection voltage
- ◆ Low current consumption:
 - * Operation mode $< 6\mu\text{A}$ ($\text{VDD}=3.9\text{V}$)
 - * Auto Recovery Overdischarge mode $< 6\mu\text{A}$
 - * Power Down mode $< 0.1\mu\text{A}$ ($\text{VDD}=2.0\text{V}$)
- ◆ Charger connected pin adopts high-withstand-voltage design (CS/OC pin absolute max. rating: 20V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Package: SOT-23-6
- ◆ Wide operation temperature range: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- ◆ All products are in Green packages: Pb & Halogen-free



SOT-23-6

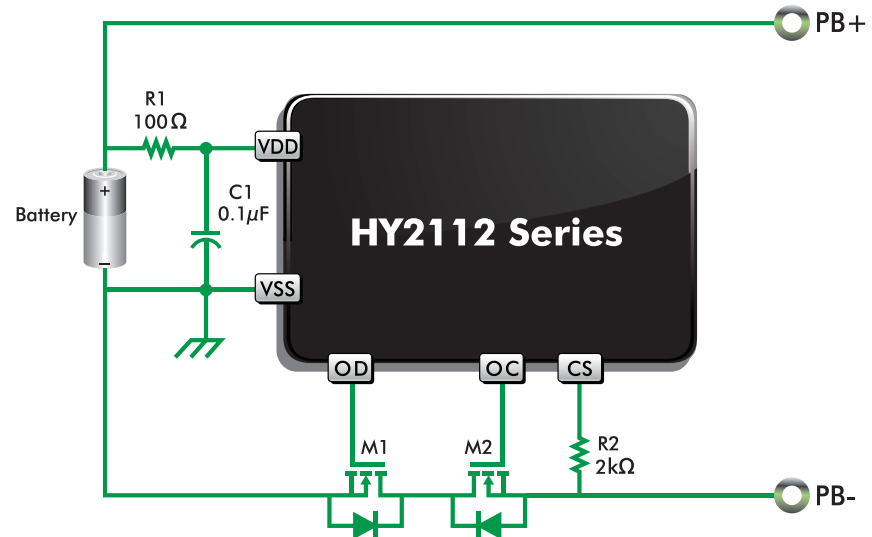
Model No.	Overcharge Detection Voltage	Overcharge Release Voltage	Overdischarge Detection Voltage	Overdischarge Release Voltage	Discharge Overcurrent Detection Voltage	Charge Overcurrent Detection Voltage	Short Circuit Detection Voltage	0V Battery Charge Function	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time	Overdischarge Detection Delay Time	Discharge Overcurrent Detection Delay Time	Charge Overcurrent Detection Delay Time	Load Short Circuiting Detection Delay Time	Over-charge release mode
	VCU	VCR	VDL	VDR	VDIP	VCIP	VSIP	VOCH		TOC	TOD	TDIP	TCIP	TSIP	
HY2111-EB	4.280 V	4.080 V	2.400 V	2.500 V	150 mV	-100 mV	0.85 V	Available	P	100 ms	25 ms	10 ms	12 ms	500 μs	Unavailable
HY2111-GB	4.280 V	4.080 V	2.900 V	3.000 V	150 mV	-100 mV	0.85 V	Available	P	100 ms	25 ms	10 ms	12 ms	500 μs	Unavailable
HY2111-HB	4.280 V	4.080 V	2.900 V	3.000 V	200 mV	-100 mV	0.85 V	Available	P	100 ms	25 ms	10 ms	12 ms	500 μs	Unavailable
HY2111-KB	4.280 V	4.080 V	2.400 V	2.500 V	225 mV	-100 mV	0.85 V	Available	A	100 ms	25 ms	10 ms	12 ms	500 μs	Unavailable
HY2111-OB	4.280 V	4.080 V	2.400 V	2.500 V	150 mV	-100 mV	0.85 V	Available	A	100 ms	25 ms	10 ms	12 ms	500 μs	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Single Cell Primary Protectors

HY2112 Series Main Features

- ◆ Suitable for LiFePO4 cell
- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ $\pm 25\text{mV}$ accuracy of overcharge detection voltage
- ◆ Low current consumption:
 - * Operation mode $< 6\mu\text{A}$ ($\text{VDD}=3.9\text{V}$)
 - * Power Down mode $< 0.1\mu\text{A}$ ($\text{VDD}=2.0\text{V}$)
- ◆ Charger connected pin adopts high-withstand-voltage design (CS/OC pin absolute max. rating: 20V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Package: SOT-23-6
- ◆ Wide operation temperature range: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- ◆ All products are in Green packages: Pb & Halogen-free



SOT-23-6

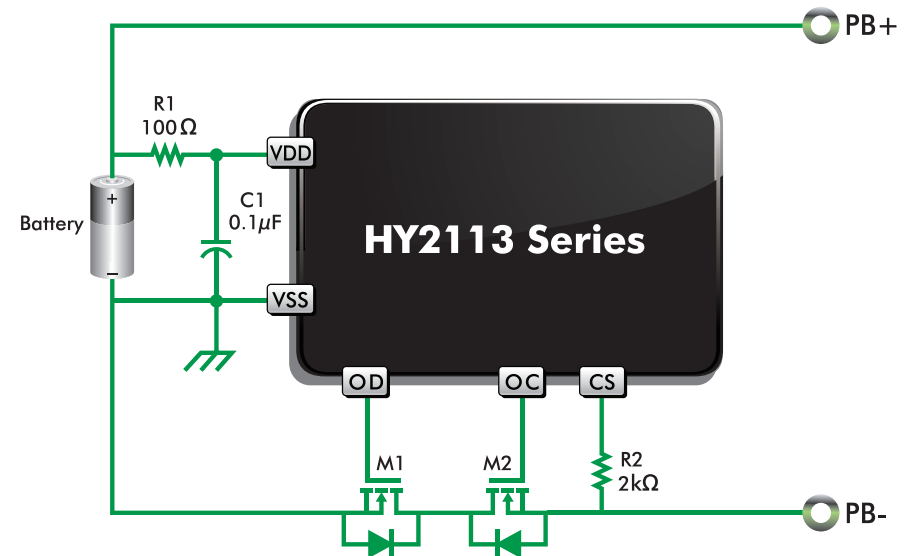
Model No.	Overcharge Detection Voltage	Overcharge Release Voltage	Overdischarge Detection Voltage	Overdischarge Release Voltage	Discharge Overcurrent Detection Voltage	Charge Overcurrent Detection Voltage	Short Circuit Detection Voltage	OV Battery Charge Function	Power-down Function/Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time	Overdischarge Detection Delay Time	Discharge Overcurrent Detection Delay Time	Charge Overcurrent Detection Delay Time	Load Short Circuiting Detection Delay Time	Over-charge release mode
	VCU	VCR	VDL	VDR	VDIP	VCIP	VSIP	VOCH		TOC	TOD	TDIP	TCIP	TSIP	
HY2112-AB	3.750 V	3.600 V	2.100 V	2.300 V	100 mV	-200 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2112-BB	3.750 V	3.600 V	2.100 V	2.300 V	150 mV	-200 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2112-CB	3.750 V	3.600 V	2.100 V	2.300 V	200 mV	-200 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2112-EB	3.900 V	3.750 V	2.100 V	2.300 V	200 mV	-200 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2112-GB	3.750 V	3.250 V	1.825 V	2.370 V	100 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2112-HB	3.650 V	3.450 V	2.500 V	3.000 V	200 mV	-250 mV	0.85 V	Available	P	1000 ms	145 ms	24 ms	16 ms	300 μ s	Unavailable
HY2112-LB5A	3.600 V	3.600 V	2.500 V	3.000 V	100 mV	-100 mV	0.85 V	Available	P	1000 ms	145 ms	24 ms	16 ms	300 μ s	Unavailable

Notice(1) : Power-down Function=P; Auto Overdischarge Recovery Function=A

Single Cell Primary Protectors

HY2113 Series Main Features

- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ High precision charge/discharge overcurrent detection voltage is flexibly configurable
- ◆ Low current consumption:
Operation mode < 6 μ A (VDD=3.9V) / Sleep mode < 0.1 μ A (VDD=2.0V)
- ◆ Charger connected pin adopts high-withstand-voltage design
(CS/OC pin absolute max. rating:20V)
- ◆ 0V battery charge function:"Available" or "Unavailable" is optional
- ◆ Multiple package: SOT-23-6 and SON (1.6x1.6mm)
- ◆ Wide operation temperature range: -40°C~+85°C
- ◆ All products are in Green packages: Pb & Halogen-free





SOT-23-6

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	OV Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP	Over-charge release mode
HY2113-AB1A	4.280 V	4.080 V	2.300 V	2.300 V	125 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-BB1A	4.325 V	4.125 V	2.500 V	2.800 V	150 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-CB1A	4.275 V	4.075 V	2.300 V	2.300 V	150 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-DB1A	4.275 V	4.175 V	2.300 V	2.400 V	100 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-EB1B	4.300 V	4.100 V	2.300 V	2.300 V	250 mV	-100 mV	0.85 V	Available	A	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-FB2B	4.250 V	4.050 V	2.500 V	2.800 V	200 mV	-100 mV	0.85 V	Available	A	1000 ms	20 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-GB3A	4.280 V	4.080 V	3.000 V	3.000 V	75 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	6 ms	8 ms	300 μ s	Unavailable
HY2113-HB3A	4.280 V	4.280 V	2.800 V	2.800 V	50 mV	-50 mV	0.85 V	Available	P	1300 ms	145 ms	6 ms	8 ms	300 μ s	Unavailable
HY2113-IB2C	4.190 V	4.190 V	2.700 V	3.000 V	100 mV	-40 mV	0.85 V	Unavailable	A	1000 ms	20 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-JB1B	4.275 V	4.075 V	2.800 V	2.800 V	150 mV	-100 mV	0.85 V	Available	A	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-KB5B	4.250 V	4.190 V	2.800 V	3.000 V	150 mV	-100 mV	0.85 V	Available	A	1000 ms	145 ms	24 ms	16 ms	300 μ s	Unavailable
HY2113-LB1A	4.200 V	4.200 V	2.500 V	2.500 V	150 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-MB1A	4.280 V	4.280 V	2.800 V	2.800 V	250 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable

Notice(1) : Power-down Function=P; Auto Overdischarge Recovery Function=A

SOT-23-6

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	OV Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP	Over-charge release mode
HY2113-MB1B	4.280 V	4.280 V	2.800 V	2.800 V	250 mV	-100 mV	0.85 V	Available	A	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-OB1A	4.400 V	4.200 V	2.800 V	3.000 V	150 mV	-200 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-OB1B	4.400 V	4.200 V	2.800 V	3.000 V	150 mV	-200 mV	0.85 V	Available	A	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-OB1C	4.400 V	4.200 V	2.800 V	3.000 V	150 mV	-200 mV	0.85 V	Unavailable	A	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-PB5B	4.250 V	4.190 V	2.500 V	3.000 V	150 mV	-100 mV	0.85 V	Available	A	1000 ms	145 ms	24 ms	16 ms	300 μ s	Unavailable
HY2113-RB1A	4.280 V	4.130 V	2.800 V	3.100 V	100 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-UB2B	4.475 V	4.275 V	2.500 V	2.700 V	150 mV	-150 mV	0.85 V	Available	A	1000 ms	20 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-UB4L	4.475 V	4.475 V	2.465 V	2.700 V	150 mV	-125 mV	0.85 V	Unavailable	A	250 ms	20 ms	12 ms	8 ms	170 μ s	Unavailable
HY2113-UB6C	4.475 V	4.475 V	2.465 V	2.700 V	100 mV	-100 mV	0.85 V	Unavailable	A	1000 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-WB2B	4.425 V	4.225 V	2.800 V	3.000 V	150 mV	-150 mV	0.85 V	Available	A	1000 ms	20 ms	12 ms	8 ms	300 μ s	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

SON (1.6 x 1.6mm)

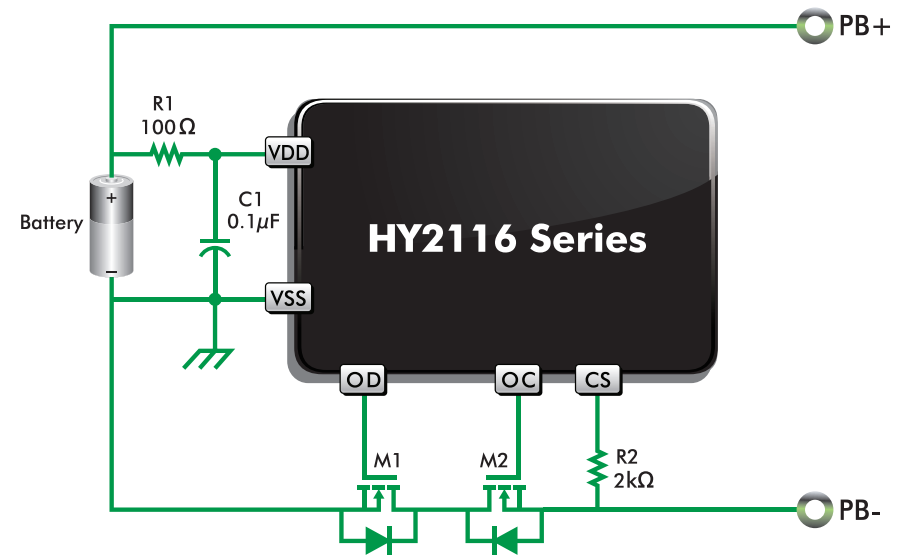
Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	OV Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP	Over-charge release mode
HY2113-AH1A	4.280 V	4.080 V	2.300 V	2.300 V	125 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-CH1A	4.280 V	4.280 V	2.800 V	2.800 V	150 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-GH3A	4.400 V	4.200 V	2.800 V	3.000 V	75 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	6 ms	8 ms	300 μ s	Unavailable
HY2113-MH1B	4.280 V	4.280 V	2.800 V	2.800 V	250 mV	-100 mV	0.85 V	Available	A	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-OH1A	4.400 V	4.200 V	2.800 V	3.000 V	150 mV	-200 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-OH1B	4.400 V	4.200 V	2.800 V	3.000 V	150 mV	-200 mV	0.85 V	Available	A	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-OH1C	4.400 V	4.200 V	2.800 V	3.000 V	150 mV	-200 mV	0.85 V	Unavailable	A	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-RH1A	4.280 V	4.130 V	2.800 V	3.100 V	100 mV	-100 mV	0.85 V	Available	P	1300 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-UH4L	4.475 V	4.475 V	2.465 V	2.700 V	150 mV	-125 mV	0.85 V	Unavailable	A	250 ms	20 ms	12 ms	8 ms	170 μ s	Unavailable
HY2113-UH2B	4.475 V	4.275 V	2.500 V	2.700 V	150 mV	-150 mV	0.85 V	Available	A	1000 ms	20 ms	12 ms	8 ms	300 μ s	Unavailable
HY2113-UH6C	4.475 V	4.475 V	2.465 V	2.700 V	100 mV	-100 mV	0.85 V	Unavailable	A	1000 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Single Cell Primary Protectors

HY2116 Series Main Features

- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ High precision charge/discharge overcurrent detection voltage is flexibly configurable
- ◆ Low current consumption:
 - * Operation mode < 6 μ A (VDD=3.9V)
 - * Sleep mode < 0.1 μ A (VDD=2.0V)
- ◆ Charger connected pin adopts high-withstand-voltage design (CS/OC pin absolute max. rating: 20V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Auto overdischarge recovery function "Yes" or "No" is selectable
- ◆ Multiple package: SOT-23-6 and SON (1.6x1.6mm)
- ◆ Wide operation temperature range: -40°C~+85°C
- ◆ All products are in Green packages: Pb & Halogen-free



SOT-23-6

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	OV Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP	Over-charge release mode
HY2116-AB6B	4.280 V	4.100 V	2.400 V	2.500 V	180 mV	-225 mV	0.85 V	Available	A	1000 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2116-BB6A	4.350 V	4.150 V	2.500 V	3.000 V	150 mV	-200 mV	0.85 V	Available	P	1000 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2116-DB6B	4.275 V	4.175 V	3.000 V	3.200 V	150 mV	-200 mV	0.85 V	Available	A	1000 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2116-FB5B	4.300 V	4.250 V	2.500 V	3.000 V	200 mV	-225 mV	0.85 V	Available	A	1000 ms	145 ms	24 ms	16 ms	300 μ s	Unavailable
HY2116-GB2B	4.425 V	4.275 V	2.800 V	3.000 V	225 mV	-225 mV	0.85 V	Available	A	1000 ms	20 ms	12 ms	8 ms	300 μ s	Unavailable
HY2116-HB2B	4.420 V	4.235 V	2.500 V	2.700 V	200 mV	-225 mV	0.85 V	Available	A	1000 ms	20 ms	12 ms	8 ms	300 μ s	Unavailable
HY2116-OB6A	4.425 V	4.225 V	2.500 V	2.500 V	150 mV	-200 mV	0.85 V	Available	P	1000 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2116-OB6B	4.425 V	4.225 V	2.500 V	2.700 V	150 mV	-150 mV	0.85 V	Available	A	1000 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable
HY2116-UB2B	4.475 V	4.275 V	2.500 V	2.700 V	225 mV	-200 mV	0.85 V	Available	A	1000 ms	20 ms	12 ms	8 ms	300 μ s	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

SON6 (1.6 x 1.6mm)

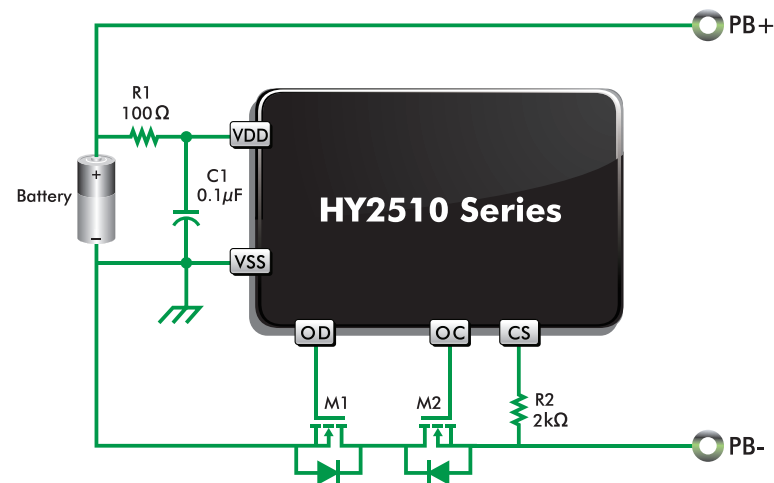
Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	OV Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP	Over-charge release mode
HY2116-DH6B	4.275 V	4.175 V	3.000 V	3.200 V	150 mV	-200 mV	0.85 V	Available	A	1000 ms	145 ms	12 ms	8 ms	300 μ s	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Single Cell Primary Protectors

HY2510 Series Main Features

- ◆ Built-in high precision voltage detection circuit overcharge detect voltage (Accuracy: $\pm 20\text{mV}$) and delay circuit
- ◆ High precision charge/discharge overcurrent detection voltage is flexibly configurable
- ◆ Small overcurrent detection voltage ($\leq 50\text{mV}$) is optional
- ◆ Small short-circuiting detection voltage ($< 0.5\text{V}$) is optional
- ◆ Low current consumption:
 - * Operation mode $< 6\mu\text{A}$ ($V_{\text{DD}}=3.9\text{V}$)
 - * Sleep mode $< 0.1\mu\text{A}$ ($V_{\text{DD}}=2.0\text{V}$)
 - * Overdischarge mode: $< 0.5\mu\text{A}$ ($V_{\text{DD}}=2.0\text{V}$)
- ◆ Charger connected pin adopts high-withstand-voltage design (CS/OC pin absolute max. rating: 20V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Multiple package: SOT-23-6, and SON (1.6x1.6mm)
- ◆ Wide operation temperature range: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- ◆ All products are in Green packages: Pb & Halogen-free



SON6 (1.6 X 1.6mm)

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	0V Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP
HY2510BA-H2B	4.475 V	4.275 V	2.500 V	2.900 V	130 mV	-100 mV	0.400 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μs
HY2510BB-H2B	4.475 V	4.275 V	2.800 V	3.000 V	130 mV	-100 mV	0.400 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μs
HY2510BC-H2B	4.450 V	4.250 V	2.500 V	2.900 V	190 mV	-150 mV	0.500 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μs

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	0V Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP
HY2510BE-H2B	4.425 V	4.225 V	2.500 V	2.900 V	130 mV	-100 mV	0.400 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BF-H2B	4.425 V	4.225 V	2.800 V	3.000 V	130 mV	-100 mV	0.400 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BG-H2B	4.280 V	4.080 V	2.500 V	2.900 V	150 mV	-100 mV	0.400 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BH-H2B	4.280 V	4.080 V	2.800 V	3.000 V	150 mV	-100 mV	0.400 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BJ-H2C	4.475 V	4.275 V	2.500 V	2.900 V	45 mV	-40 mV	0.100 V	Unavailable	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BK-H2B	4.280 V	4.080 V	2.400 V	2.800 V	235 mV	-100 mV	0.700 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BO-H2D	4.280 V	4.080 V	2.800 V	3.000 V	70 mV	-70 mV	0.200 V	Unavailable	P	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BP-H2D	4.425 V	4.225 V	2.800 V	3.000 V	45 mV	-45 mV	0.150 V	Unavailable	P	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BQ-H2D	4.450 V	4.250 V	2.800 V	3.000 V	45 mV	-45 mV	0.150 V	Unavailable	P	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BR-H2D	4.450 V	4.250 V	2.800 V	3.000 V	25 mV	-25 mV	0.100 V	Unavailable	P	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BS-H4A	4.495 V	4.295 V	2.500 V	2.700 V	45 mV	-45 mV	0.150 V	Available	P	1000 ms	32 ms	32 ms	16 ms	350 μ s
HY2510BT-H4D	4.475 V	4.275 V	2.500 V	2.900 V	60 mV	-60 mV	0.200 V	Unavailable	P	1000 ms	32 ms	32 ms	16 ms	350 μ s
HY2510BW-H4D	4.545 V	4.345 V	2.500 V	2.700 V	60 mV	-60 mV	0.200 V	Unavailable	P	1000 ms	32 ms	32 ms	16 ms	350 μ s
HY2510CC-H3F	4.280 V	4.080 V	2.400 V	2.800 V	235 mV	-100 mV	0.700 V	Available	A	1000 ms	96 ms	16 ms	8 ms	350 μ s
HY2510CH-H3F	4.350 V	4.350 V	2.800 V	3.000 V	50 mV	-10 mV	0.300 V	Available	A	1000 ms	96 ms	16 ms	8 ms	350 μ s

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

SOT-23-6

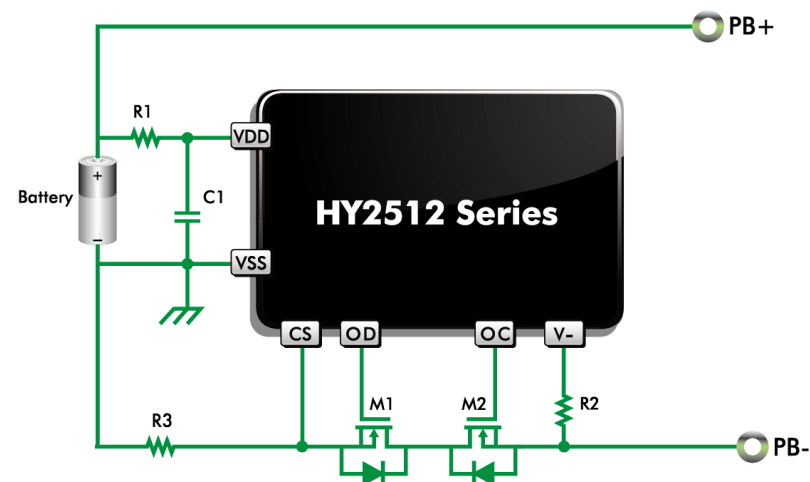
Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	0V Battery Charge Function V0CH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP
HY2510BK-B2B	4.280 V	4.080 V	2.400 V	2.800 V	235 mV	-100 mV	0.700 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BM-B2B	4.375 V	4.175 V	2.500 V	2.900 V	200 mV	-100 mV	0.500 V	Available	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510BM-B2C	4.375 V	4.175 V	2.500 V	2.900 V	200 mV	-100 mV	0.500 V	Unavailable	A	1000 ms	20 ms	12 ms	8 ms	350 μ s
HY2510CC-B3F	4.280 V	4.080 V	2.400 V	2.800 V	235 mV	-100 mV	0.700 V	Available	A	1000 ms	96 ms	16 ms	8 ms	350 μ s
HY2510CD-B3F	4.160 V	4.000 V	2.800 V	3.100 V	250mV	-100 mV	0.700 V	Available	A	1000 ms	96 ms	16 ms	8 ms	350 μ s
HY2510CE-B3F	4.250 V	4.250 V	2.800 V	3.000 V	100 mV	-100 mV	0.300 V	Available	A	1000 ms	96 ms	16 ms	8 ms	350 μ s
HY2510CF-B5F	4.200 V	4.100 V	2.700 V	3.000 V	100 mV	-100 mV	0.300 V	Available	A	1000 ms	96 ms	128 ms	8 ms	350 μ s
HY2510CI-B3F	4.425 V	4.225 V	2.300 V	2.500 V	250 mV	-100 mV	0.700 V	Available	A	1000 ms	96 ms	16 ms	8 ms	350 μ s
HY2510CM-B5H	3.650 V	3.450 V	2.300 V	2.500 V	50 mV	-50 mV	0.300 V	Unavailable	P	1000 ms	96 ms	128 ms	8 ms	350 μ s

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Single Cell Primary Protectors

HY2512 Series Main Features

- ◆ High precision voltage detection circuit
 - * Overcharge detection voltage 4.000~4.600V Accuracy: $\pm 15\text{mV}$
 - * Overcharge release voltage 3.800~4.600V Accuracy: $\pm 30\text{mV}$
 - * Overdischarge detection voltage 2.000~3.200V Accuracy: $\pm 35\text{mV}$
 - * Overdischarge release voltage 2.000~3.400V Accuracy: $\pm 50\text{mV}$
 - * Discharge overcurrent detection voltage 5mV to 20mV Accuracy: $\pm 1\text{mV} \sim \pm 5\text{mV}$
 - * Charge overcurrent detection voltage -5mV to -20mV Accuracy: $\pm 1\text{mV} \sim \pm 5\text{mV}$
 - * Short-circuiting detection voltage 30mV to 100mV
- ◆ Low current consumption:
 - * Operation mode 2.5 μA typ., 5.0 μA max. (VDD=3.9V)
 - * Overdischarge Current Consumption 0.2 μA typ., 0.5 μA max. (VDD=2.0V)
 - * over down Current 0.1 μA (VDD=2.0V)
- ◆ Delay times are generated by an internal circuit (external capacitors are unnecessary).
- ◆ “Auto over discharge recovery” or “Power Down function” (external capacitors are unnecessary)
- ◆ 0 V battery charge function is selectable: “Available” or “Unavailable”
- ◆ High-withstanding-voltage: CS pin and OC pin: Absolute maximum rating=20 V.
- ◆ Wide operation temperature range: -40°C to +85°C
- ◆ Package : SON6-1.6x1.6-6L , SOT-23-6
- ◆ Halogen-free, green package



SON6 (1.6 X 1.6mm)

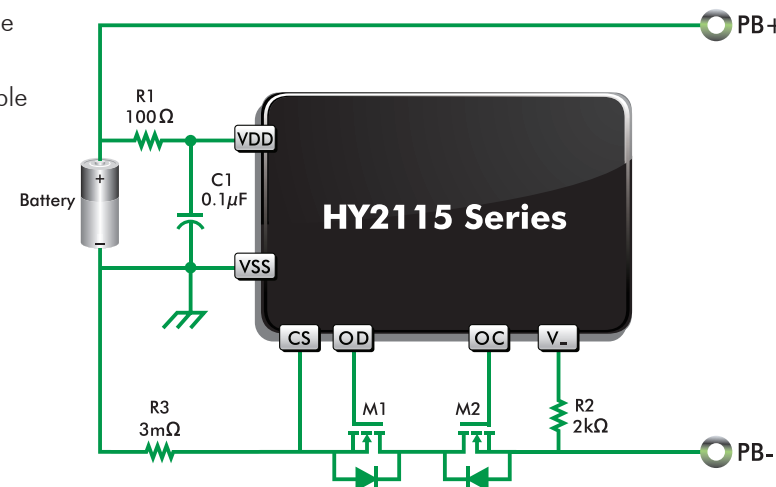
Model No.	Overcharge Detection Voltage	Overcharge Release Voltage	Overdischarge Detection Voltage	Overdischarge Release Voltage	Discharge Overcurrent Detection Voltage	Discharge Overcurrent Detection Voltage	Charge Overcurrent Detection Voltage	Short Circuit Detection Voltage	0V Battery Charge Function	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time	Overdischarge Detection Delay Time	Discharge Overcurrent Detection Delay Time	Discharge Overcurrent Detection Delay Time	Charge Overcurrent Detection Delay Time	Load Short Circuiting Detection Delay Time TSIP
	VCU	VCR	VDL	VDR	VDIP	VDIP2	VCIP	VSIP	VOCH		TOC	TOD	TDIP	TDIP2	TCIP	
HY2512AA-H3C	4.545 V	4.345 V	2.500 V	2.900 V	14 mV	-	-15 mV	40 mV	Unavailable	A	1024 ms	64 ms	64 ms	-	32 ms	300 μ s
HY2512AB-H4C	4.590 V	4.390 V	2.300 V	2.500 V	14 mV	-	-15 mV	50 mV	Unavailable	A	1024 ms	64 ms	128 ms	-	64 ms	300 μ s
HY2512AK-H8B	4.520 V	4.320 V	2.800 V	3.000 V	12 mV	-	-12 mV	30 mV	Available	A	1024 ms	64 ms	32 ms	-	32 ms	300 μ s
HY2512AL-H6C	4.570 V	4.370 V	2.500 V	2.700 V	13 mV	-	-13 mV	30 mV	Unavailable	A	1024 ms	64 ms	64 ms	-	64 ms	550 μ s
HY2512WA-H9C	4.525 V	4.375 V	2.350 V	2.550 V	10.5 mV	16.5 mV	-24.0 mV	42.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512WB-H9C	4.575 V	4.375 V	2.100 V	2.300 V	10.5 mV	16.5 mV	-27.0 mV	42.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512WC-H9C	4.495 V	4.345 V	2.350 V	2.550 V	21.0 mV	30.0 mV	-21.0 mV	80.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512WD-H9C	4.550 V	4.350 V	2.100 V	2.300 V	21.0 mV	30.0 mV	-29.0 mV	80.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512WE-H9C	4.525 V	4.375 V	2.350 V	2.550 V	10.5 mV	15.0 mV	-15.0 mV	40.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512WF-H9C	4.575 V	4.375 V	2.100 V	2.300 V	10.5 mV	15.0 mV	-18.0 mV	40.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512BG-H9C	4.575 V	4.425 V	2.350 V	2.550 V	10.5 mV	16.5 mV	-24.0 mV	42.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512BH-H9C	4.625 V	4.425 V	2.100 V	2.300 V	10.5 mV	16.5 mV	-27.0 mV	42.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512BI-H9C	4.575 V	4.425 V	2.350 V	2.550 V	10.5 mV	15.0 mV	-15.0 mV	42.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512BJ-H9C	4.625 V	4.425 V	2.100 V	2.300 V	10.5 mV	15.0 mV	-18.0 mV	42.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512BK-H9C	4.575 V	4.425 V	2.350 V	2.550 V	10.5 mV	15.0 mV	-29.5 mV	42.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s
HY2512BL-H9C	4.625 V	4.425 V	2.100 V	2.300 V	10.5 mV	15.0 mV	-33.0 mV	42.0 mV	Unavailable	A	1024 ms	64 ms	3600 ms	16 ms	16 ms	300 μ s

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Single Cell Primary Protectors

HY2115 Series Main Features

- ◆ Provide high precision overcurrent detection when used with current sense resistance
- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ High precision charge/discharge overcurrent detection voltage is flexibly configurable
- ◆ Low current consumption:
 - * Operation mode < 6μA (VDD=3.9V)
 - * Sleep mode < 0.1μA (VDD=2.0V)
- ◆ Charger connected pin adopts high-withstand-voltage design (V-/OC pin absolute max. rating: 20V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Auto overdischarge recovery function "Yes" or "No" is selectable
- ◆ Package: SOT-23-6
- ◆ Wide operation temperature range: -40°C~+85°C
- ◆ All products are in Green packages: Pb & Halogen-free



SOT-23-6

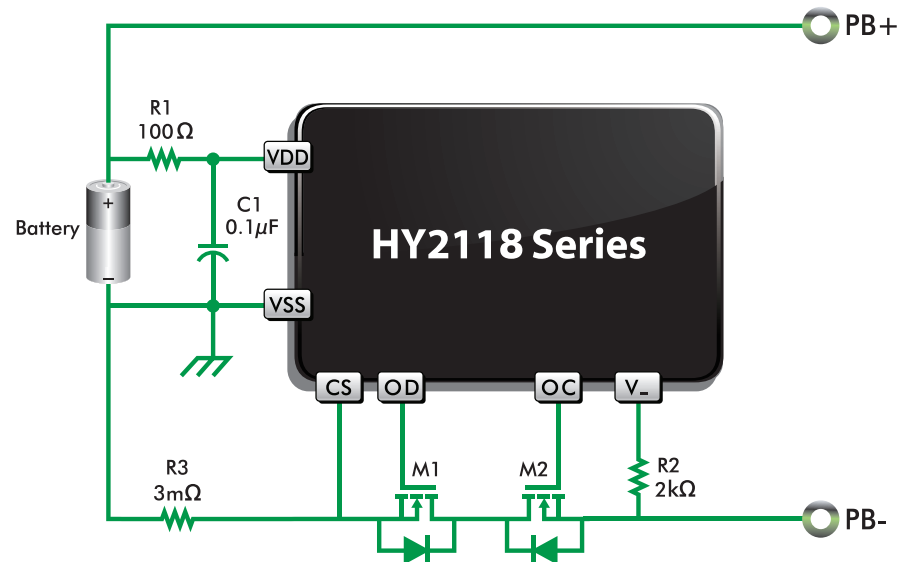
Model No.	Overcharge Detection Voltage	Overcharge Release Voltage	Overdischarge Detection Voltage	Overdischarge Release Voltage	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	0V Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP	Over-charge release mode
HY2115-LB9D	4.280 V	4.280 V	2.800 V	2.800 V	42 mV	-50 mV	0.85 V	Unavailable	P	1040 ms	120 ms	8 ms	8 ms	300 μs	Unavailable
HY2115-KB9D	4.405 V	4.405 V	2.800 V	2.800 V	42 mV	-50 mV	0.85 V	Unavailable	P	1040 ms	120 ms	8 ms	8 ms	300 μs	Unavailable
HY2115-OB9D	4.450 V	4.450 V	2.800 V	2.800 V	42 mV	-30 mV	0.85 V	Unavailable	P	1040 ms	120 ms	8 ms	8 ms	300 μs	Unavailable
HY2115-MB9D	4.280 V	4.280 V	2.400 V	2.400 V	42 mV	-30 mV	0.85 V	Unavailable	P	1040 ms	120 ms	8 ms	8 ms	300 μs	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Single Cell Primary Protectors

HY2118 Series Main Features

- ◆ Provide high precision short current detection when used with current sense resistance
- ◆ Provide high precision overcurrent detection when used with current sense resistance
- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ High precision charge/discharge overcurrent detection voltage is flexibly configurable
- ◆ Low current consumption:
 - * Operation mode < 8 μ A (VDD=3.9V)
 - * Sleep mode < 0.1 μ A (VDD=2.0V)
- ◆ Charger connected pin adopts high-withstand-voltage design (V-/OC pin absolute max. rating: 20V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Auto overdischarge recovery function "Yes" or "No" is selectable
- ◆ Package: DFN6 (1.4x1.4mm) EP
- ◆ Wide operation temperature range: -40°C ~ +85°C
- ◆ All products are in Green packages: Pb & Halogen-free



DFN6 (1.4 x 1.4mm) EP

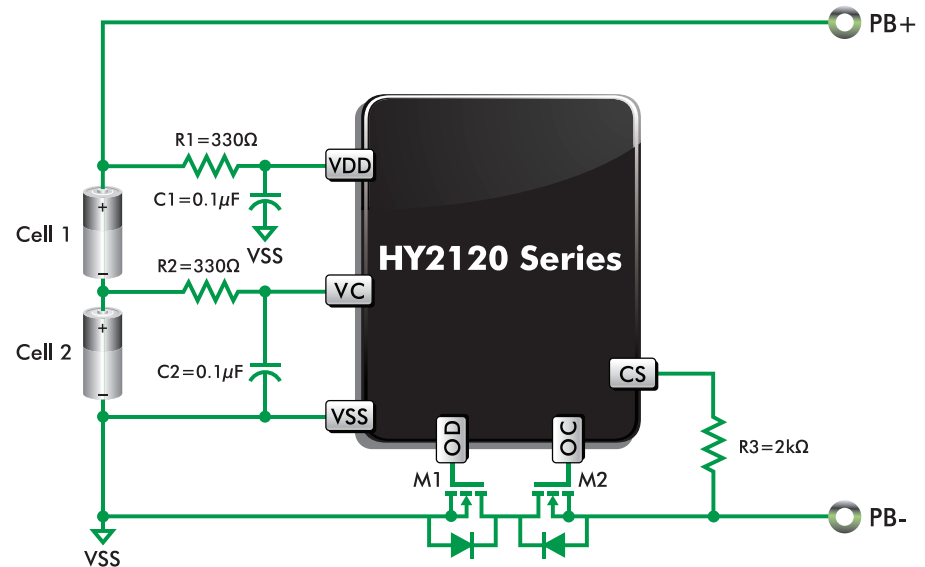
Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge Detection Voltage VDL	Overdischarge Release Voltage VDR	Discharge Overcurrent Detection Voltage VDIP	Charge Overcurrent Detection Voltage VCIP	Short Circuit Detection Voltage VSIP	0V Battery Charge Function VOCH	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time TOC	Overdischarge Detection Delay Time TOD	Discharge Overcurrent Detection Delay Time TDIP	Charge Overcurrent Detection Delay Time TCIP	Load Short Circuiting Detection Delay Time TSIP	Over-charge release mode
HY2118-AG2J	4.425 V	4.425 V	2.400 V	2.400 V	34 mV	-22 mV	0.18 V	Unavailable	P	1000 ms	20 ms	12 ms	16 ms	250 μ s	Unavailable
HY2118-CG2J	4.425 V	4.425 V	2.800 V	2.800 V	40 mV	-30 mV	0.18 V	Unavailable	P	1000 ms	20 ms	12 ms	16 ms	250 μ s	Unavailable
HY2118-GG2J	4.280 V	4.280 V	2.800 V	2.800 V	30 mV	-20 mV	0.18 V	Unavailable	P	1000 ms	20 ms	12 ms	16 ms	250 μ s	Unavailable
HY2118-LG2J	4.475 V	4.475 V	2.400 V	2.400 V	40 mV	-25 mV	0.18 V	Unavailable	P	1000 ms	20 ms	12 ms	16 ms	250 μ s	Unavailable
HY2118-QG2J	4.450 V	4.450 V	2.600 V	2.600 V	40 mV	-30 mV	0.18 V	Unavailable	P	1000 ms	20 ms	12 ms	16 ms	250 μ s	Unavailable
HY2118-SG2J	4.230 V	4.230 V	2.600 V	2.600 V	35mV	-22 mV	0.18 V	Unavailable	P	1000 ms	20 ms	12 ms	16 ms	250 μ s	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Multi Cell Primary Protectors

HY2120 Series Main Features

- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ Low current consumption:
 - * Operation mode $< 9\mu\text{A}$ ($V_{DD}=7.8\text{V}$)
 - * Sleep mode $< 0.1\mu\text{A}$ ($V_{DD}=4.0\text{V}$)
- ◆ Charger connected pin adopts high-withstand-voltage design (CS/OC pin absolute max. rating: 33V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Package: SOT-23-6
- ◆ Wide operation temperature range: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
- ◆ All products are in Green packages: Pb & Halogen-free
- ◆ Auto overdischarge recovery function "Yes" or "No" is selectable



SOT-23-6

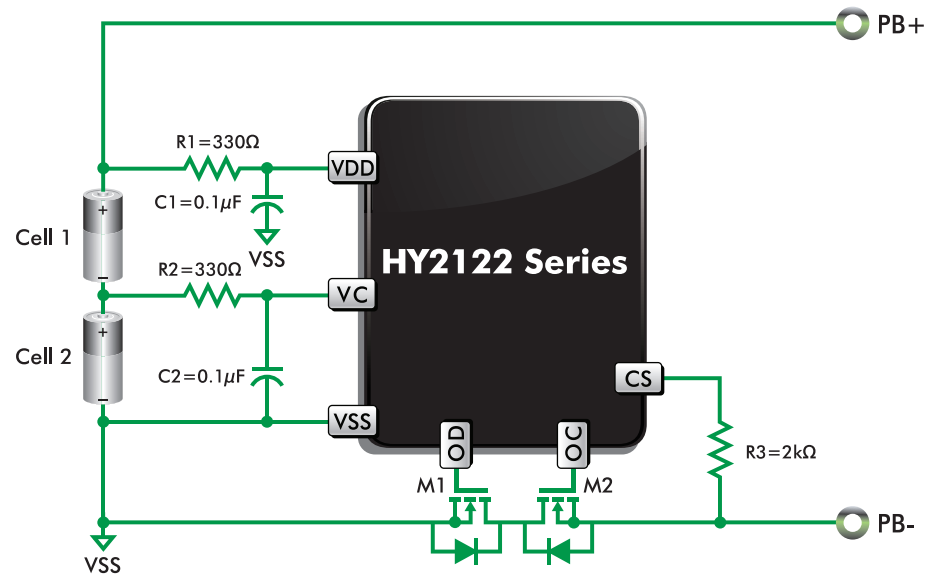
Model No.	Overcharge Detection Voltage	Overcharge Release Voltage	Overdischarge Detection Voltage	Overdischarge Release Voltage	Discharge Overcurrent Detection Voltage	Charge Overcurrent Detection Voltage	Short Circuit Detection Voltage	0V Battery Charge Function	Power-down Function/ Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time	Overdischarge Detection Delay Time	Discharge Overcurrent Detection Delay Time	Charge Overcurrent Detection Delay Time	Load Short Circuiting Detection Delay Time	Over-charge release mode
	VCUn	VCRn	VDLn	VDRn	VDIP	VCIP	VSIP	VOCH		TOC	TOD	TDIP	TCIP	TSIP	
HY2120-AB	4.350 V	4.150 V	2.300 V	3.000 V	300 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-BB	4.350 V	4.150 V	2.300 V	3.000 V	200 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-CB	4.280 V	4.080 V	2.900 V	3.000 V	200 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-DB	4.280 V	4.080 V	2.250 V	2.950 V	200 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-EB	4.280 V	4.080 V	2.250 V	2.950 V	150 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-FB	4.300 V	4.100 V	2.900 V	3.000 V	200 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-GB	4.280 V	4.080 V	3.100 V	3.200 V	200 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-HB	4.380 V	4.180 V	2.400 V	2.600 V	200 mV	-210 mV	1.0 V	Available	A	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-LB	4.250 V	4.050 V	2.800 V	3.000 V	200 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Available
HY2120-MB	4.450 V	4.250 V	2.250 V	2.950 V	200 mV	-210 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-NB	4.280 V	4.080 V	2.800 V	3.000 V	200 mV	-210 mV	1.0 V	Available	A	1000 ms	110 ms	10 ms	7 ms	250 μ s	Available
HY2120-OB	4.250 V	4.050 V	2.800 V	3.000 V	100 mV	-100 mV	1.0 V	Available	A	1000 ms	110 ms	10 ms	7 ms	250 μ s	Available
HY2120-PB	4.250 V	4.050 V	2.400 V	3.000 V	200 mV	-210 mV	1.0 V	Available	A	1000 ms	110 ms	10 ms	7 ms	250 μ s	Available
HY2120-RB	4.400 V	4.250 V	2.500 V	3.000 V	180 mV	-170 mV	0.5 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-SB	4.450 V	4.300 V	2.500 V	3.000 V	180 mV	-170 mV	0.5 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120-ZB	4.250 V	4.050 V	3.100 V	3.200 V	150 mV	-75 mV	0.5 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120MA-B1A	4.450 V	4.300 V	2.500 V	3.000 V	80 mV	-75 mV	0.5 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2120ZB-B1A	4.250 V	4.050 V	3.100 V	3.200 V	150 mV	-50 mV	0.5 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Multi Cell Primary Protectors

HY2122 Series Main Features

- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ Low current consumption:
 - * Operation mode $< 9\mu\text{A}$ ($\text{VDD}=6.4\text{V}$)
 - * Standby mode $< 0.1\mu\text{A}$
- ◆ Charger connected pin adopts high-withstand-voltage design(CS/OC pin absolute max. rating: 33V)
- ◆ 0V battery charge function: "Available" or "Unavailable" is optional
- ◆ Package: SOT-23-6
- ◆ Wide operation temperature range: $-40^{\circ}\text{C}\sim+85^{\circ}\text{C}$
- ◆ All products are in Green packages: Pb & Halogen-free
- ◆ Auto overdischarge recovery function "Yes" or "No" is selectable



SOT-23-6

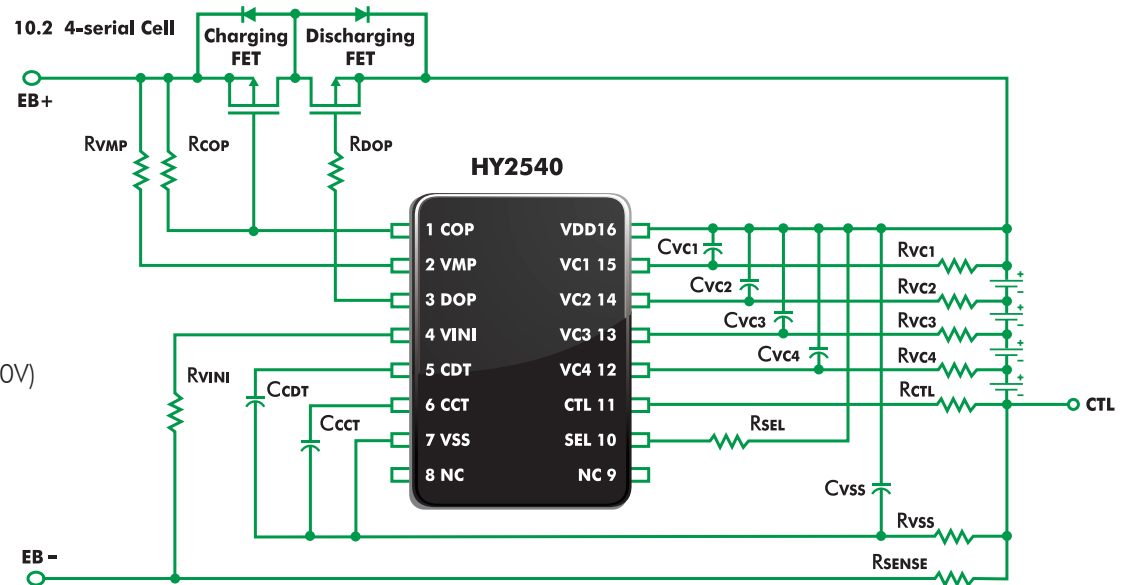
Model No.	Overcharge Detection Voltage	Overcharge Release Voltage	Overdischarge Detection Voltage	Overdischarge Release Voltage	Discharge Overcurrent Detection Voltage	Charge Overcurrent Detection Voltage	Short Circuit Detection Voltage	OV Battery Charge Function	Power-down Function/Auto Overdischarge Recovery Function Notice(1)	Overcharge Detection Delay Time	Overdischarge Detection Delay Time	Discharge Overcurrent Detection Delay Time	Charge Overcurrent Detection Delay Time	Load Short Circuiting Detection Delay Time	Over-charge release mode
	VCUn	VCRn	VDLn	VDRn	VDIP	VCIP	VSIP	VOCH		TOC	TOD	TDIP	TCIP	TSIP	
HY2122-AB1A	3.650 V	3.450 V	2.000 V	2.500 V	200 mV	-200 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2122-AB1B	3.650 V	3.450 V	2.000 V	2.500 V	200 mV	-200 mV	1.0 V	Available	A	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2122-BB1A	3.750 V	3.250 V	1.800 V	2.300 V	200 mV	-200 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2122-EB1A	3.950 V	3.500 V	2.200 V	2.500 V	200 mV	-200 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2122-FB1A	3.650 V	3.500 V	2.500 V	2.800 V	200 mV	-200 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable
HY2122-GB1A	3.800 V	3.600 V	2.200 V	2.500 V	200 mV	-200 mV	1.0 V	Available	P	1000 ms	110 ms	10 ms	7 ms	250 μ s	Unavailable

Notice(1) : Power-down Function=P;Auto Overdischarge Recovery Function=A

Multi Cell Primary Protectors

HY2540 Series Main Features

- ◆ High-accuracy voltage detection circuit for 3/4 Cell Application
- ◆ Charge overcurrent protection
- ◆ Three-level discharge overcurrent protection
- ◆ Delay time:
 - * Delay times are set by external capacitors respectively at CCT pin and CDT pin for overcharge detection, /charge overcurrent detection and overdischarge detection/discharge overcurrent detection voltage 1.
 - * Delay times are set internally for discharge overcurrent detection voltage 2 (1 ms) and discharge overcurrent detection 3 (300μs).
- ◆ Cell number selection: SEL pin is used to select either 3 battery cells in use or 4 battery cells in use.
- ◆ Charge/discharge operation can be controlled via the CTL pin.
- ◆ 0V Battery Charge inhibition
- ◆ High voltage withstand range: Absolute maximum rated level: 28V
- ◆ Wide operating temperature range: -40°C to +85°C
- ◆ Low current consumption:
 - * Operation mode 12μA typ., 30μA max. (VCn = 3.5V)
 - * Power-down mode 1.2μA typ., 2.0μA max. (VCn = 2.0V)
- ◆ Small package: 16-pin TSSOP
- ◆ Halogen free green product



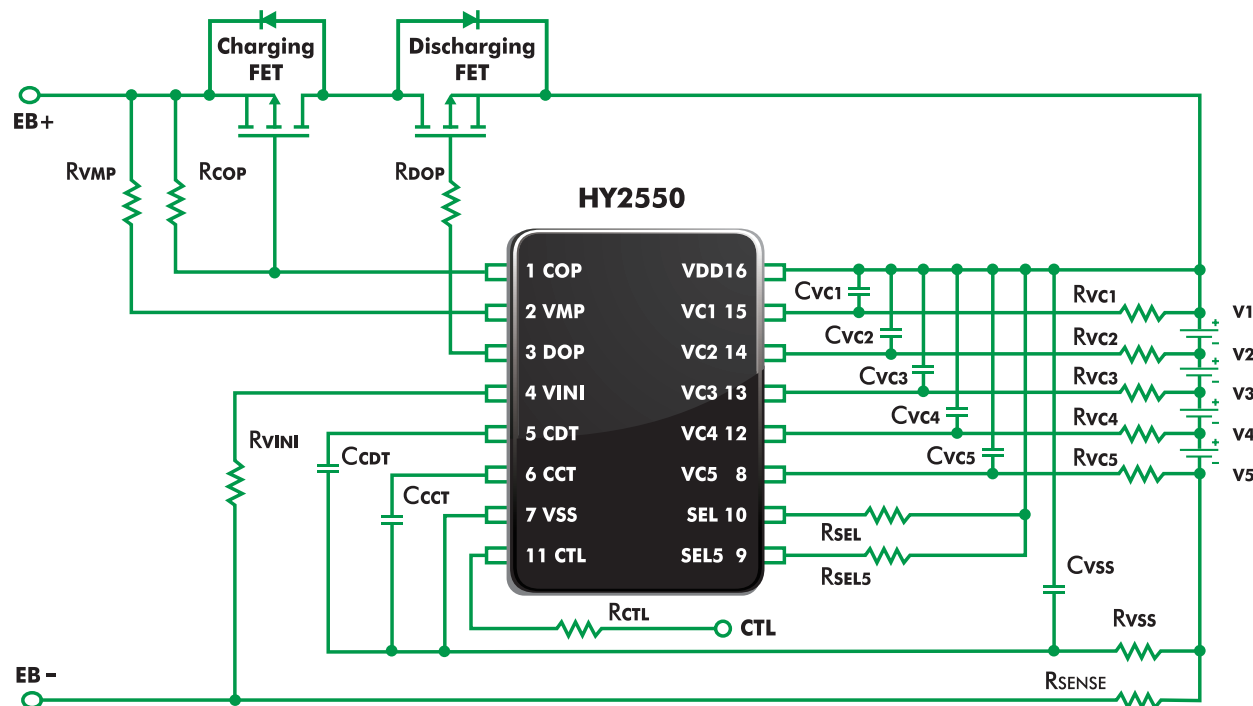
TSSOP16L

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge detection voltage VDL	Overdischarge release voltage VDR	Overcurrent detection voltage1 VIOV1	Overcurrent detection voltage2 VIOV2	Overcurrent detection voltage1 VCIP	0V battery charge function
HY2540AA-T016-AC	4.350 V	4.150 V	2.400 V	3.000 V	0.200 V	0.500 V	-0.100 V	Available
HY2540AB-T016-AC	4.250 V	4.150 V	2.700 V	3.000 V	0.200 V	0.500 V	-0.100 V	Available
HY2540AC-T016-AC	3.900 V	3.800 V	2.000 V	2.500 V	0.150 V	0.500 V	-0.100 V	Available
HY2540AD-T016-AC	4.250 V	4.150 V	2.500 V	3.000 V	0.100 V	0.500 V	-0.100 V	Available
HY2540AE-T016-AC	4.225 V	4.075 V	2.400 V	3.000 V	0.200 V	0.500 V	-0.100 V	Available
HY2540AF-T016-AC	4.425 V	4.225 V	2.500 V	2.900 V	0.150 V	0.500 V	-0.100 V	Available
HY2540AH-T016-AC	4.475 V	4.275 V	2.500 V	2.900 V	0.150 V	0.500 V	-0.100 V	Available
HY2540AO-T016-AC	4.520 V	4.320 V	2.500 V	2.900 V	0.150 V	0.500 V	-0.100 V	Available
HY2540AP-T016-AC	4.495 V	4.295 V	2.500 V	2.900 V	0.150 V	0.500 V	-0.100 V	Available

Multi Cell Primary Protectors

HY2550 Series Main Features

- ◆ High-accuracy voltage detection circuit for 3/4/5 Cell Application
- ◆ Charge overcurrent protection
- ◆ Three-level discharge overcurrent protection
- ◆ Delay time:
 - * Delay times are set by external capacitors respectively at CCT pin and CDT pin for overcharge detection, /charge overcurrent detection and overdischarge detection/discharge overcurrent detection voltage 1.
 - * Delay times are set internally for discharge overcurrent detection voltage 2 (1ms) and discharge overcurrent detection 3 (300μs).
- ◆ Cell number selection: SEL pin is used to select either 3 cells or 4 cells in use.
SEL5 pin is used to select 5 cells in use when SEL pin is also set to “1”
- ◆ Charge/discharge operation can be controlled via the CTL pin.
- ◆ 0V Battery Charge inhibition
- ◆ High voltage withstand range: Absolute maximum rated level: 28V
- ◆ Wide operating temperature range: -40°C to +85°C
- ◆ Low current consumption:
 - * Operation mode 12μA typ., 30μA max. (VCn = 3.5V)
 - * Power-down mode 1.2μA typ., 2.0μA max. (VCn = 2.0V)
- ◆ Small package: 16-pin TSSOP
- ◆ Halogen free green product



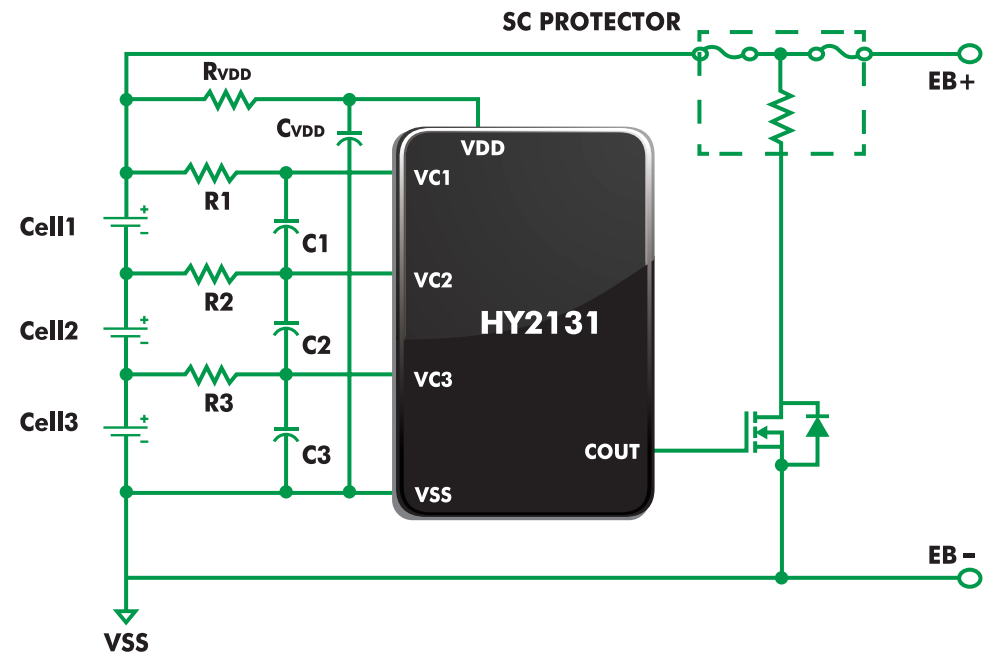
TSSOP16L

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overdischarge detection voltage VDL	Overdischarge release voltage VDR	Overcurrent detection voltage1 VIOV1	Overcurrent detection voltage2 VIOV2	Overcurrent detection voltage1 VCIP1	0V battery charge function
HY2550AA-T016-AC	4.350 V	4.150 V	2.400 V	3.000 V	0.200 V	0.500 V	-0.100 V	Available
HY2550AB-T016-AC	4.250 V	4.150 V	2.700 V	3.000 V	0.200 V	0.500 V	-0.100 V	Available
HY2550AC-T016-AC	3.900 V	3.800 V	2.000 V	2.500 V	0.150 V	0.500 V	-0.100 V	Available

Multi Cell Secondary Protectors

HY2131 Series Main Features

- ◆ High-accuracy voltage detection circuit
- ◆ Delay time is set by internal circuit (external capacitor is not needed)
- ◆ Delay time shortening function: overcharge detection delay time can be shortened by specific setup
- ◆ Output logic: Active high CMOS output; the high level is 4.7V (typical) output from regulator
- ◆ Low current consumption:
 - * Operation mode < 3.0μA typ., 6.0μA max. (VCelln=3.9V)
 - * Standby mode < 0.5μA max. (VCelln=3.1V)
- ◆ Selection of 2-cell/3-cell application: either 2-cell or 3-cell is selectable by means of external circuit
- ◆ High voltage resistant design: the absolute maximum rated value is 30V
- ◆ Wide operating temperature range: -40°C~+85°C
- ◆ Multiple package: TSOT-23-6 & SON-6L
- ◆ Halogen free green product



TSOT-23-6

Model No.	Overcharge Detection Voltage VCUn	Overcharge Release Voltage VCRn	Standby Detection Voltage VSB	Overcharge Detection Delay Time TOC	Overcharge Release Delay Time TCR	Reset Delay Time of Overcharge Detection Counter TDTR
HY2131-AF1A	4.350 V	4.050 V	3.5 V	6000 ms	16 ms	6 ms
HY2131-BF1A	4.450 V	4.150 V	3.5 V	6000 ms	16 ms	6 ms
HY2131-CF1A	4.400 V	4.100 V	3.5 V	6000 ms	16 ms	6 ms
HY2131-DF1A	4.500 V	4.200 V	3.5 V	6000 ms	16 ms	6 ms
HY2131-EF1A	4.550 V	4.250 V	3.5 V	6000 ms	16 ms	6 ms
HY2131-GF1A	4.200 V	4.100 V	3.5 V	2000 ms	16 ms	6 ms

SON-6L (1.6 x 1.6mm)

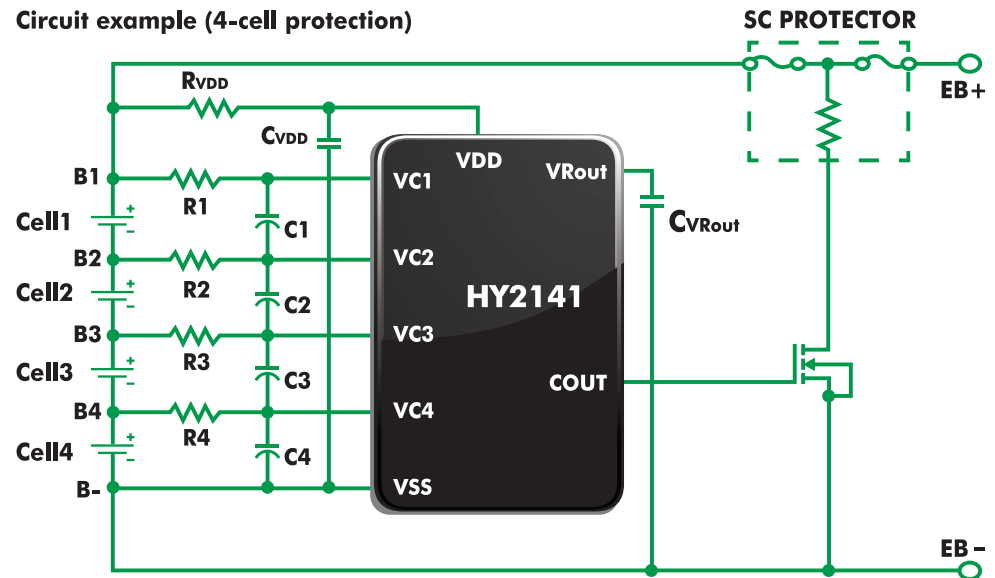
Model No.	Overcharge Detection Voltage VCUn	Overcharge Release Voltage VCRn	Standby Detection Voltage VSBn	Overcharge Detection Delay Time TOCn	Overcharge Release Delay Time TCRn	Reset Delay Time of Overcharge Detection Counter TDTR
HY2131-DH2A	4.500 V	4.200 V	3.5 V	4000 ms	16 ms	6 ms

Multi Cell Secondary Protectors

HY2141 Series Main Features

- ◆ High-accuracy voltage detection circuit
- ◆ Delay time is set by internal circuit (external capacitor is not needed)
- ◆ Delay time shortening function: overcharge detection delay time can be shortened by specific setup
- ◆ Output logic: Active high CMOS output; the high level is 4.7V (typical) output from regulator
- ◆ Output logic active high maximum time: (optional; not-limited as default)
- ◆ Low current consumption:
 - * Operation mode 5.0 μ A typ., 9.0 μ A max. (VCelln=4.15V)
 - * OV detection OFF mode 4.5 μ A typ., 8.0 μ A max. (VCelln=3.1V)
- ◆ LDO OFF mode 0.5 μ A typ., 1.0 μ A max. (VCelln=2.0V)
- ◆ Standby mode 0.5 μ A maximum. (VCelln=1.5V)
- ◆ Selection of 2-cell/3-cell/4-cell application: either 2-cell or 3-cell or 4-cell is selectable by means of external circuit
- ◆ LDO output circuit
- ◆ LDO output voltage 3.3V Accuracy: ± 65 mV
- ◆ LDO output current 2.5mA (maximum)
- ◆ High voltage resistant design: the absolute maximum rated value is 30V
- ◆ Wide operating temperature range: -40°C ~ +85°C
- ◆ Package: DFN8 (2.0x2.0mm)
- ◆ Halogen free green product

Circuit example (4-cell protection)



DFN8 (2.0 x 2.0mm)

Model No.	Overcharge Detection Voltage VCUn	Overcharge Release Voltage VCRn	Shutdown 2 Detection Voltage VSD2n	Overcharge Detection Delay Time TOCn	Overcharge Release Delay Time TCRn	Reset Delay Time of Overcharge Detection Counter TDTR	LDO Regulated Output Voltage VLDO	Shutdown 2 Detection Delay Time TSD2n
HY2141-AA1C	4.350 V	4.050 V	2.500 V	6.0 s	16 ms	6 ms	3.300 V	6 s
HY2141-DA1C	4.500 V	4.200 V	2.500 V	6.0 s	16 ms	6 ms	3.300 V	6 s
HY2141-DA1D	4.500 V	4.200 V	2.500 V	6.0 s	16 ms	6 ms	3.000 V	6 s
HY2141-DA1G	4.500 V	4.200 V	2.500 V	6.0 s	16 ms	<0.6 ms	3.300 V	6 s
HY2141-TA1H	4.500 V	4.200 V	3.055 V	6.0 s	16 ms	<0.6 ms	3.000 V	6 s
HY2141-EA1D	4.550 V	4.250 V	2.500 V	6.0 s	16 ms	6 ms	3.000 V	6 s
HY2141-EA1H	4.550 V	4.250 V	2.500 V	6.0 s	16 ms	<0.6 ms	3.000 V	6 s
HY2141-MA1G	4.550 V	4.250 V	2.800 V	6.0 s	16 ms	<0.6 ms	3.300 V	6 s
HY2141-UA1H	4.550 V	4.250 V	3.055 V	6.0 s	16 ms	<0.6 ms	3.000 V	6 s
HY2141-FA1D	4.600 V	4.250 V	2.500 V	6.0 s	16 ms	6 ms	3.000 V	6 s
HY2141-FA1H	4.600 V	4.250 V	2.500 V	6.0 s	16 ms	<0.6 ms	3.000 V	6 s

Multi Cell Secondary Protectors

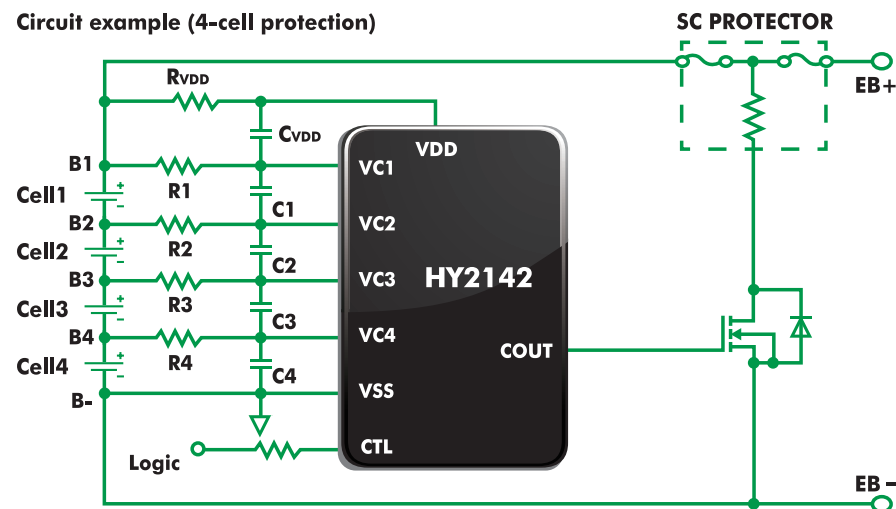
HY2142 Series Main Features

- ◆ High-accuracy voltage detection circuit
- ◆ Delay time is set by internal circuit (external capacitor is not needed)
- ◆ Built-in timer reset delay circuit
- ◆ Output control function via CTL pin
- ◆ Output is CMOS output Active "H"
- ◆ Output logic active high maximum time: (optional; not-limited as default)
- ◆ Low current consumption
 - * Operation mode ($V_{cu} = 3.5V$) $3.0\mu A$ typ., $6.6\mu A$ max.
 - * Overdischarge mode ($V_{cu} = 2.3V$) $2.0\mu A$ typ., $4.0\mu A$ max.
- ◆ High voltage resistant design: the absolute maximum rated value is 30V.
- ◆ Wide operating temperature range: $-40^{\circ}C \sim +85^{\circ}C$
- ◆ Package: DFN8 (1.97x2.46mm) & DFN8 (2.0x2.0mm)
- ◆ Halogen free green product

DFN8 (1.97 × 2.46mm)

Model No.	Overcharge Detection Voltage V_{CU_n}	Overcharge Release Voltage V_{CR_n}	Overcharge Detection Delay Time TOC_n	Overcharge Release Delay Time TCR_n	Reset Delay Time of Overcharge Detection Counter TDTR
HY2142-AJ4C	4.350 V	3.950 V	4.0 s	64 ms	12 ms
HY2142-CJ4C	4.450 V	4.050 V	4.0 s	64 ms	12 ms
HY2142-ZJ2C	4.300 V	3.900 V	2.0 s	64 ms	12 ms
HY2142-DJ6G	4.500 V	4.100 V	6.0 s	64 ms	<0.6 ms

Circuit example (4-cell protection)



DFN8 (2.0 × 2.0mm)

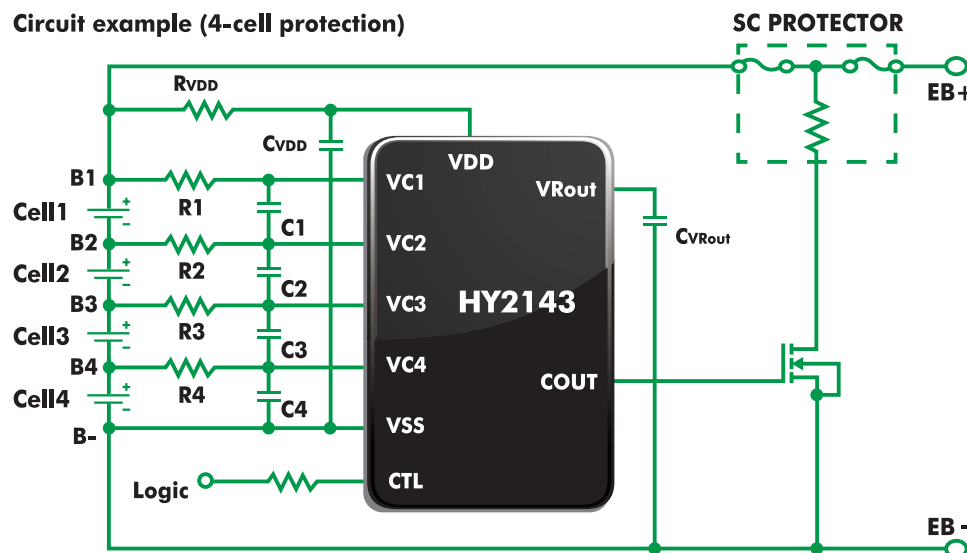
Model No.	Overcharge Detection Voltage V_{CU_n}	Overcharge Release Voltage V_{CR_n}	Overcharge Detection Delay Time TOC_n	Overcharge Release Delay Time TCR_n	Reset Delay Time of Overcharge Detection Counter TDTR
HY2142-AA6G	4.350 V	3.950 V	6.0 s	64 ms	<0.6 ms
HY2142-DA4C	4.500 V	4.100 V	4.0 s	64 ms	12 ms
HY2142-EA6G	4.550 V	4.150 V	6.0 s	64 ms	<0.6 ms
HY2142-FA6G	4.600 V	4.200 V	6.0 s	64 ms	<0.6 ms

Multi Cell Secondary Protectors

HY2143 Series Main Features

- ◆ High-accuracy voltage detection circuit
- ◆ Delay time is set by internal circuit (external capacitor is not needed)
- ◆ Output logic: (active high voltage-limited output) Output-high voltage level is 4.7V
- ◆ Output logic active high maximum time: (optional; not-limited as default)
- ◆ Low current
 - * Operation mode 5.0 μ A typ., 9.0 μ A max.(VCelln = 3.9V)
 - * Shutdown mode 1 (VCelln = 3.1V, LDO ON) 4.5 μ A typ., 8.0 μ A max.(VCelln = 3.1V)
 - * Shutdown mode 2 (VCelln = 2.0V, LDO OFF) 0.6 μ A typ., 1.0 μ A max.(VCelln = 2.0V)
- ◆ LDO output circuit
- ◆ LDO output voltage 3.0V/3.3V typ. Accuracy: ± 65 mV
- ◆ LDO output current 2mA max.
- ◆ Input voltage detection level:
 - * Voltage detection level (from VDD) 2.8V typ.(Accuracy: ± 1 V)
 - * Pull-down current (into CTL pin) 0.3 μ A typ.(Accuracy: ± 50 %)
- ◆ High voltage resistant design:
the absolute maximum rated value is 30V.
- ◆ Wide operating temperature range: -40 $^{\circ}$ C ~ +85 $^{\circ}$ C
- ◆ Package: DFN8 (2.0x2.0mm)
- ◆ Halogen free green product

Circuit example (4-cell protection)



DFN8 (2.0 x 2.0mm)

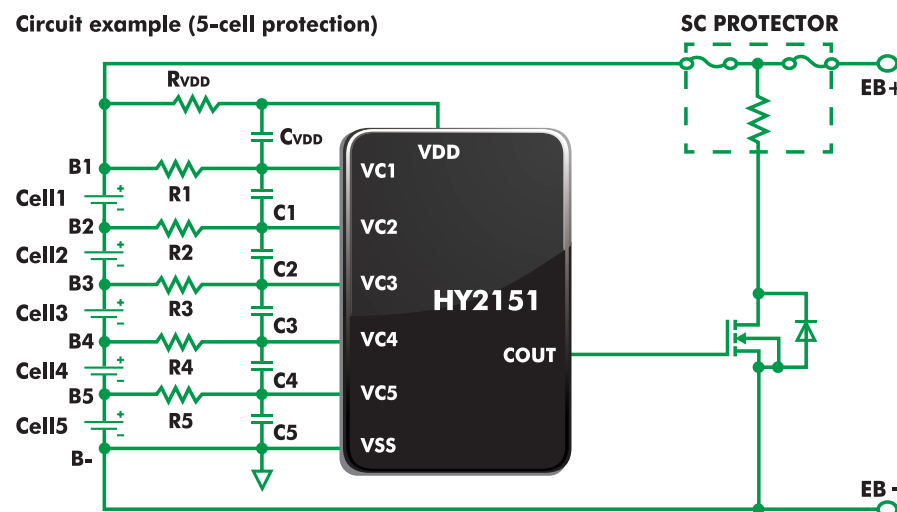
Model No.	Overcharge Detection Voltage VCUn	Overcharge Release Voltage VCRn	Shutdown 2 Detection Voltage VSD2n	Overcharge Detection Delay Time TOCn	Overcharge Release Delay Time TCRn	Reset Delay Time of Overcharge Detection Counter TDTR	LDO Regulated Output Voltage VLDO	Shutdown 2 Detection Delay Time TSD2n
HY2143-DA1C	4.500 V	4.200 V	2.500 V	6.0 s	16 ms	6 ms	3.300 V	6 s
HY2143-DA1H	4.500 V	4.200 V	2.500 V	6.0 s	16 ms	<0.6 ms	3.000 V	6 s
HY2143-EA1D	4.550 V	4.250 V	2.500 V	6.0 s	16 ms	6 ms	3.000 V	6 s
HY2143-FA1H	4.600 V	4.250 V	2.500 V	6.0 s	16 ms	<0.6 ms	3.000 V	6 s
HY2143-GA1H	4.650 V	4.300 V	2.500 V	6.0 s	16 ms	6 ms	3.000 V	6 s

Multi Cell Secondary Protectors

HY2151 Series Main Features

- ◆ High -accuracy voltage detection circuit (n = 1, 2, 3, 4, 5)
 - * Overcharge detection voltage VCU_n 4.0V to 5.0V Accuracy: $\pm 25\text{mV}$ (25°C)
 - * Overcharge release voltage VCR_n 3.8V to 5.0V Accuracy: $\pm 50\text{mV}$
- ◆ Delay time is set by internal circuit (external capacitor is not needed)
 - * Overcharge detection delay 1/2/4/6 s Accuracy: $\pm 20\%$
- ◆ Built-in timer reset delay circuit
- ◆ Output is CMOS output Active “H”
- ◆ Output logic active high maximum time: Not Limited
- ◆ Low current consumption (25°C ; n = 1, 2, 3, 4, 5)
 - * Operation mode (V_{cu}=4V) 3.2 μA typ ., 5.0 μA max.
 - * Overdischarge mode (V_{cu} = 2.3V) 0.4 μA typ ., 1.0 μA max.
- ◆ High voltage resistant design: the absolute maximum rated value is 32V.
- ◆ Wide operating temperature range: -40°C to +85°C
- ◆ Small package: DFN8 (1.97x2.46mm)
- ◆ Halogen free green product

Circuit example (5-cell protection)



DFN8 (1.97 x 2.46mm)

Model No.	Overcharge Detection Voltage VCU _n	Overcharge Release Voltage VCR _n	Overcharge Detection Delay Time TOC _n	Reset Delay Time of Overcharge Detection Counter TDTR	Broken detect
HY2151-GJ1C	4.220 V	4.170 V	1 s	12 ms	Unavailable
HY2151-ZJ1C	3.900 V	3.850 V	1 s	12 ms	Unavailable

Balance IC

HY2212 & HY2213 Series Main Features

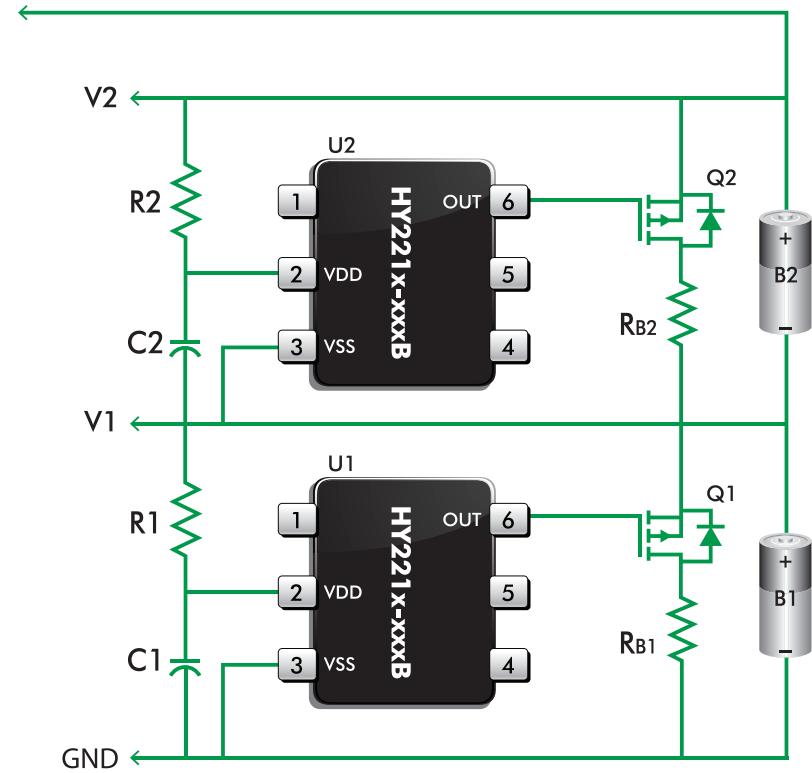
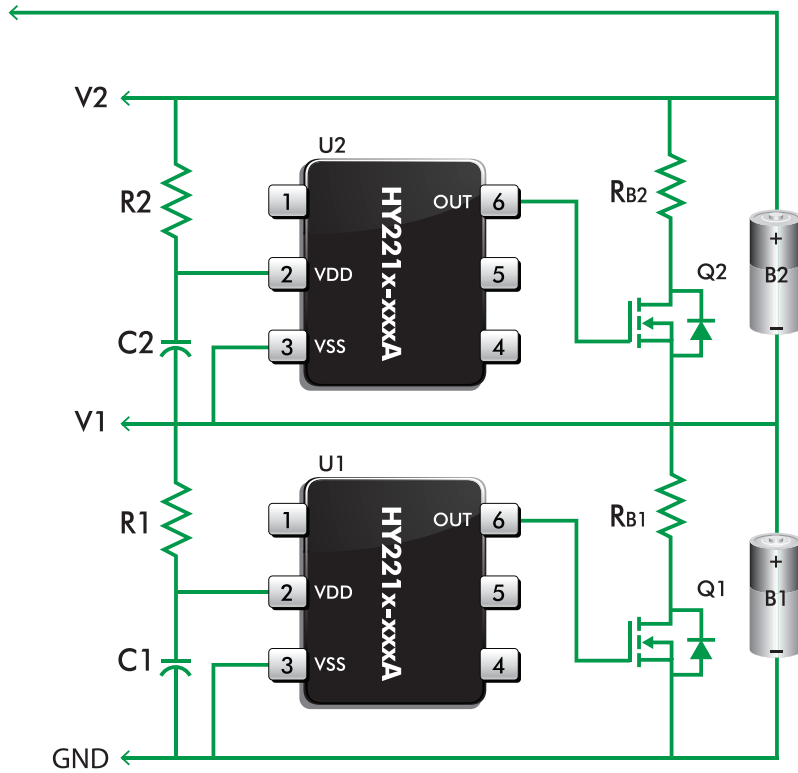
- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ Low current consumption:
 - * Operation mode < 3.5 μ A (VDD=3.2V)
 - * Standby mode < 0.5 μ A (VDD=2.0V)
- ◆ Package: SOT-23-6 package
- ◆ Wide operation temperature range: -40°C~+85°C
- ◆ All products are in Green packages: Pb & Halogen-free

SOT-23-6

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overcharge Detection Delay Time TOC	Brief introduction
HY2212-AB3B	3.600 V	3.600 V	250 ms	P-MOSFET balance control: OUT output status H $\rightarrow$ L Effective
HY2212-BB3A	3.600 V	3.590 V	250 ms	N-MOSFET balance control: OUT output status L $\rightarrow$ H Effective
HY2212-CB3A	3.450 V	3.420 V	250 ms	N-MOSFET balance control: OUT output status L $\rightarrow$ H Effective

SOT-23-6

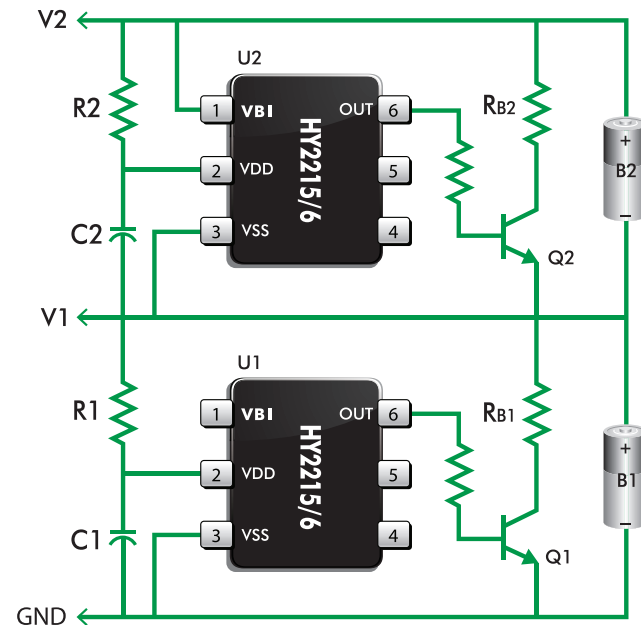
Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overcharge Detection Delay Time TOC	Brief introduction
HY2213-AB3B	4.200 V	4.200 V	250 ms	P-MOSFET balance control: OUT output status H $\rightarrow$ L Effective
HY2213-BB3A	4.200 V	4.190 V	250 ms	N-MOSFET balance control: OUT output status L $\rightarrow$ H Effective
HY2213-CB3A	4.180 V	4.180 V	250 ms	N-MOSFET balance control: OUT output status L $\rightarrow$ H Effective
HY2213-FB3A	4.130 V	4.120 V	250 ms	N-MOSFET balance control: OUT output status L $\rightarrow$ H Effective



Balance IC

HY2215 & HY2216 Series Main Features

- ◆ Built-in high precision voltage detection circuit and delay circuit
- ◆ Low current consumption:
 - * Operation mode < 3.5 μ A (VDD=3.2V)
 - * Standby mode < 0.5 μ A (VDD=2.0V)
- ◆ Package: SOT-23-6 package
- ◆ Wide operation temperature range: -40 $^{\circ}$ C~+85 $^{\circ}$ C
- ◆ All products are in Green packages: Pb & Halogen-free
- ◆ Controlling battery balance by BJT and MOSFET



SOT-23-6

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overcharge Detection Delay Time TOC	Brief introduction
HY2215-AB3B	4.200 V	4.200 V	250 ms	Balance control PNP-BJT;OUToutput status L → H effective
HY2215-BB3A	4.200 V	4.190 V	250 ms	Balance control NPN-BJT;OUToutput status L → H effective
HY2215-CB3A	4.180 V	4.180 V	250 ms	Balance control NPN-BJT;OUToutput status L → H effective

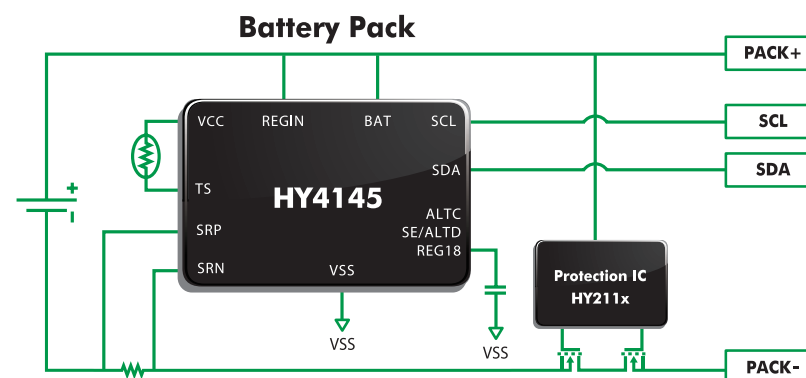
SOT-23-6

Model No.	Overcharge Detection Voltage VCU	Overcharge Release Voltage VCR	Overcharge Detection Delay Time TOC	Brief introduction
HY2216-BB3A	3.600 V	3.590 V	250 ms	Balance control NPN-BJT;OUToutput status L → H effective

Gas Gauge

HY4145 Series Main Features

- ◆ Used as stand-alone battery gauge for single Li+ cell battery applications
 - * Integrate dual 16-bit ADCs for precision voltage, current, and temperature measurements
 - * Use a low cost and low value sense resistor with calibration for current measurement
 - * Use integrated and external temperature sensors for temperature measurement
- ◆ Integrate accurate battery capacity estimate system
 - * Integrate GaugePack™ algorithm – mixed algorithm with coulomb counting, open circuit cell voltage measurement and cell characteristics
 - * Compensate Rate, temperature, age and self-discharge effects automatically
 - * Require no fully battery charge-to-discharge or discharge-to-charge recycling for capacity learning process
 - * Backup specific battery capacity information to Nonvolatile (NV) flash memory automatically
- ◆ Feature programmable protection alerts
 - * Protections for voltage, current, and temperature faults
 - * Provide pin alert for voltage, current, and temperature protection
- ◆ Backup battery lifetime data to Nonvolatile (NV) flash memory automatically
- ◆ Provide 96 bytes Nonvolatile (NV) user scratch pad flash memory



DFN12 (2.5 x 4mm)

Model No.	Cell No	Protection	Interface	Authentication	User Flash (Bytes)	Application
HY4145	1	JEITA	I ² C	SHA-1	96	System/Pack Side

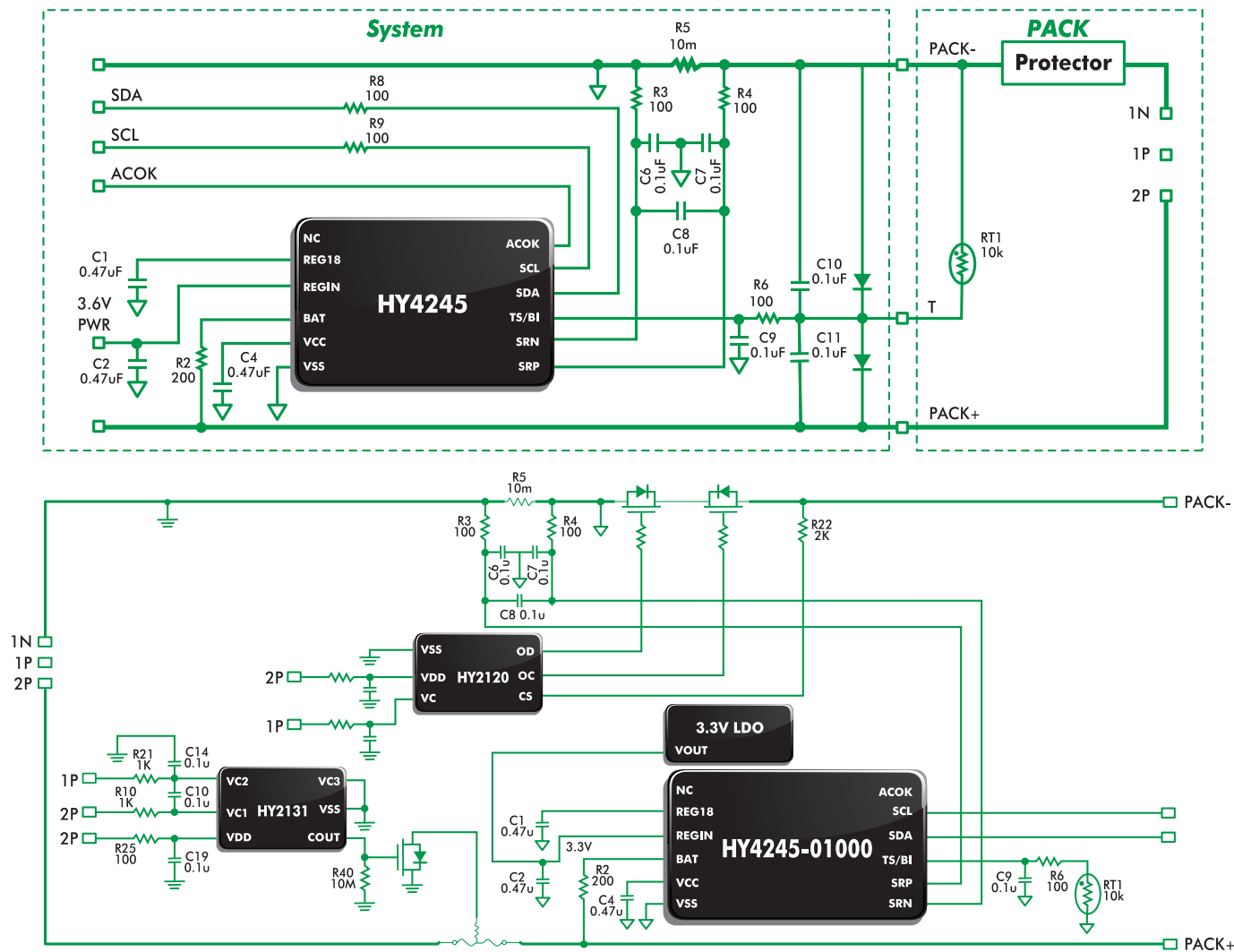
Gas Gauge

HY4245 Series Main Features

- ◆ Used as stand-alone battery gauge for 1~2 Li+ cell battery applications
 - * Integrate dual 16-bit ADCs for precision voltage, current, and temperature measurements
 - * Use a low cost and low value sense resistor with calibration for current measurement
 - * Use integrated and external temperature sensors for temperature measurement
- ◆ Integrate accurate battery capacity estimate system
 - * Integrate GaugePack™ algorithm – mixed algorithm with coulomb counting, open circuit cell voltage measurement and cell characteristics
 - * Compensate Rate, temperature, age and self-discharge effects automatically
 - * Require no fully battery charge-to-discharge or discharge-to-charge recycling for capacity learning process
 - * Backup specific battery capacity information to Nonvolatile (NV) flash memory automatically
- ◆ Feature programmable protection alerts
- ◆ Protections for voltage, current, and temperature faults
- ◆ Provide pin alert for voltage, current, and temperature protection
- ◆ Backup battery lifetime data to Nonvolatile (NV) flash memory automatically
- ◆ Provide 96 bytes Nonvolatile (NV) user scratch pad flash memory

DFN12 (2.5 x 4mm)

Model No.	Cell No	Protection	Interface	Authentication	User Flash (Bytes)	Application
HY4245	1~2	JEITA	I ² C	SHA-1	96	System/Pack Side



Gas Gauge

HY4222 Series Main Features

- ◆ Used as stand-alone battery gauge for Multiple Li+ Cell battery applications
 - * Integrate dual 16-bit ADCs for precision voltage, current, and temperature measurements
 - * Use a low cost and low value sense resistor with calibration for current measurement
 - * Use integrated and external temperature sensors for temperature measurement
- ◆ Integrate accurate battery capacity estimate system
 - * Integrate GaugePack™ algorithm – mixed algorithm with coulomb counting, open circuit cell voltage measurement and cell characteristics
 - * Compensate rate, temperature, age and self-discharge effects automatically
 - * Require no fully battery charge-to-discharge or Discharge-to-charge recycling for capacity learning process
 - * Backup specific battery capacity information to Nonvolatile (NV) Flash memory automatically
- ◆ Support LEDs for capacity indication
- ◆ Feature programmable protection alerts
 - * Protections for voltage, current, and temperature faults
 - * Provide pin alert for voltage, current, and temperature protection
- ◆ Backup battery lifetime data to Nonvolatile (NV) Flash memory automatically
- ◆ Provide 96 bytes Nonvolatile (NV) user scratch pad Flash memory

TSSOP-20

Model No.	Cell No	Protection	Interface	Authentication	User Flash (Bytes)
HY4222	Multiple	JEITA	2-Wire (I ² C)	SHA-1	96



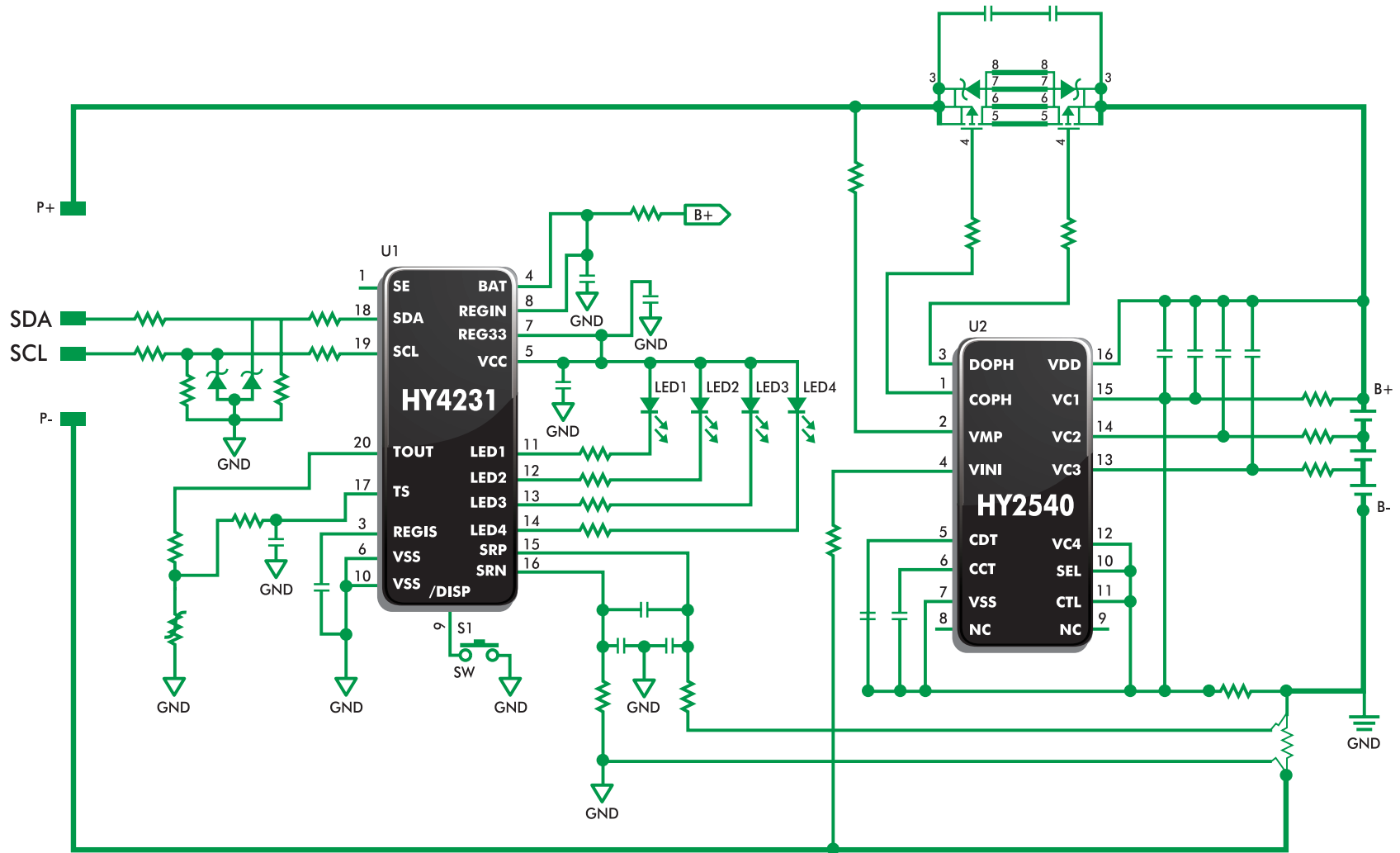
Gas Gauge

HY4231 Series Main Features

- ◆ Used as stand-alone battery gauge for 1 to 3 Li+ Cell battery applications
 - * Integrate dual 16-bit ADCs for precision voltage, current, and temperature measurements
 - * Use a low cost and low value sense resistor with calibration for current measurement
 - * Use integrated and external temperature sensors for temperature measurement
- ◆ Integrate accurate battery capacity estimate system
 - * Integrate GaugePack™ algorithm – mixed algorithm with coulomb counting, open circuit cell voltage measurement and cell characteristics
 - * Compensate rate, temperature, age and self-discharge effects automatically
 - * Require no fully battery charge-to-discharge or discharge-to-charge recycling for capacity learning process
 - * Backup specific battery capacity information to Nonvolatile (NV) Flash memory automatically
- ◆ Feature programmable battery capacity indications
 - * Provide 3 or 4 LEDs for capacity indications
- ◆ Feature programmable protection alerts
 - * Protections for voltage, current, and temperature faults
 - * Provide pin alert for voltage, current, and temperature protection
- ◆ Backup battery lifetime data to Nonvolatile (NV) Flash memory automatically
- ◆ Provide 96 bytes Nonvolatile (NV) user scratch Pad Flash memory

TSSOP-20

Model No.	Cell No	Protection	Interface	Authentication	User Flash (Bytes)
HY4231	1~3	JEITA	2-Wire (SMB)	SHA-1	96



Capacitive Touch Panel Controller

HY461xB & HY462x Series Main Features

Mutual capacitive sensing techniques:

- ◆ True multi-touch with up to 11 points of absolute X and Y coordinates
- ◆ 32-bit Micro-controller for algorithm execution
- ◆ Supports auto-calibration function to prevent environmental variations
- ◆ HY461xB supports up to 44 transmit lines and 28 receive lines
- ◆ HY462x supports up to 24 transmit lines and 12 receive lines
- ◆ Supports more than 100Hz high report rate
- ◆ Capable of driving single channel (transmit/receive) resistance: up to 60K
- ◆ Classifying and rejecting unintended touch, e.g., a resting hand on the screen
- ◆ Realize touch screen, buttons and proximity
- ◆ Gloved finger operation and waterproof function
- ◆ Immune to LCD and power noise Interferences



HY461xB and HY462x accommodate a wide range of applications with a set of buttons up to a 2D touch sensing device, their typical applications as listed below.

- Mobile phones, smart phones
- Tablet PC
- Portable MP3 and MP4 media players
- Digital cameras
- Wearable devices

HY461xB Series ICs support < 10.1inch Touch Panel

Model No.	Panel		Package		Support Stack-up	Touch Panel Size
	TX	RX	Type (mm)	Pin		
HY4613B-N048	21	12	QFN6*6	48	OGS/GFF/GG/GF	5"
HY4614B-N068	28	16	QFN8*8	68	OGS/GFF/GG/GF	7"~10.1"

HY462x Series ICs supports < 7 inch Touch Panel

Model No.	Panel		Package		Support Stack-up	Touch Panel Size
	TX	RX	Type (mm)	Pin		
HY4621-NS32	13	9	QFN4*4	32	OLS,On-cell	<5.0"
HY4623-NS48	24	12	QFN5*5	48	OLS,On-cell	5.1"~7.0"



Capacitive Touch Panel Controller

HY463x & HY463xB & HY4658 Series Main Features

Features and Specifications

- ◆ HY463xB & HY4658 & HY4665x series supports different touch sensor structures-OGS,SITO,DITO,G/F, G/F/F and G/G structure.
- ◆ Supports more than 100Hz High Report Rate
- ◆ I²C interface supported
- ◆ Supports wide Voltage operation range: 2.8V to 3.6V
- ◆ Low Power Modes Supported: Active, Standby, and Sleep
- ◆ Operating Temperature Range: -40°C~+85°C
- ◆ Optimal Sensing Mutual Capacitor: 1pF~4pF
- ◆ HY463xB & HY4658 & HY4665x series provides an excellent solution for not only finger operation but also with passive sharp tip stylus
- ◆ Supports thick cover lens<8mm
- ◆ Operation with gloved finger
- ◆ Waterproof function
- ◆ Classifying and rejecting unintended touch, e.g., a resting hand on the screen
- ◆ Realize touch screen, buttons and proximity
- ◆ Immune to power and LCD noise Interferences
- ◆ Supports auto-calibration function to prevent environmental variations
- ◆ Support Pb-free package.



HY463xB & HY4658 & HY4665x series accommodate a wide range of applications with a set of buttons up to a 2D touch sensing device, their typical applications as listed below.

- Industrial Touch PPC&HID
- Household appliances
- Navigation Systems, GPS
- Game consoles
- Car applications
- POS(Point of Sales) devices

HY463x Series ICs support

Model No.	Panel		Package		Touch Panel Size	Status
	TX	RX	Type (mm)	Pin		
HY4633B-N048	21	12	QFN6*6	48	<5.3"	M/P
HY4635B-N068	28	16	QFN8*8	68	7"~10.1"	M/P

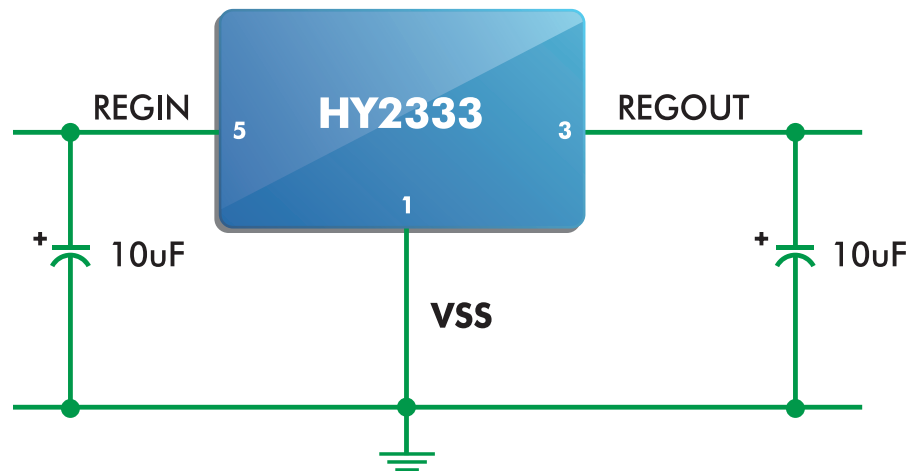
HY4658 & HY4665x Series ICs support

Model No.	Panel		Package		Touch Panel Size	Status
	TX	RX	Type (mm)	Pin		
HY4658-L128	50	30	LQFP14*14	128	<15.6"	M/P
HY4665U-N088	36	20	QFN10*10	88	10.1"~12"	M/P

Low-Dropout Voltage Regulator

HY2333 Series Main Features

- ◆ $\pm 2.5\%$ Output Accuracy
- ◆ Low Dropout: 320mV at 16mA Full Load Typically
- ◆ Wide Input Voltage Range: 4V to 35V
- ◆ Fixed Output Voltage : 3.3V
- ◆ Low Quiescent Current: 2.5uA
- ◆ Stable with Low-ESR Capacitors
- ◆ Over current Protection 125mA
- ◆ SOT-23-6 Package

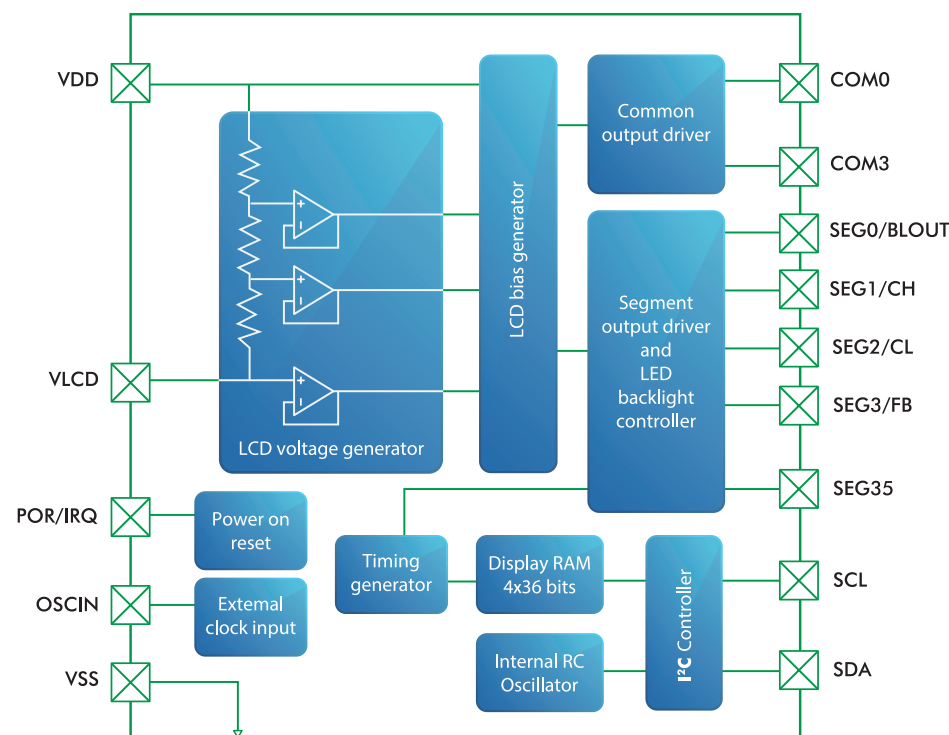


Model No.	V _{in} min.(V)	V _{in} max.(V)	V _{OUT} (V)	Accuracy (+/- %)	I _{OUT} max.(mA)	Dropout (V) @I _{OUT} (max)	Current Limit (mA)	I _Q (uA)	Package
HY2333	4	35	3.3	2.5	16	0.32	125	2.5	SOT-23-6

LCD Controller and Driver

HY2613 Series Main Features

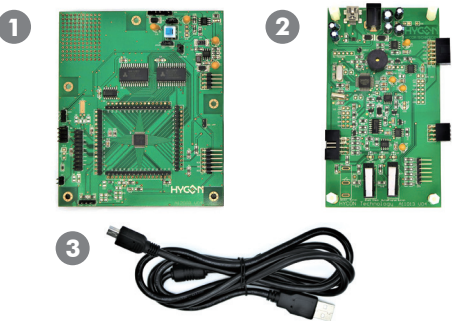
- ◆ Operation voltage: 2.4V~5.5V
- ◆ Temperature range: -40℃~+85℃
- ◆ Support max. 4x36 LCD driver, 1/2 or 1/3Bias, 1/4Duty
- ◆ High side or low side driver (Constant Adjust support)
- ◆ Built-in voltage pump has 8 output voltage
- ◆ LED back light function, constant current: 15mA/4.2V
- ◆ IRQ function output (support time base and WDT NMI)
- ◆ 2-wire I²C serial communication interface (SCL,SDA)
- ◆ Low power consumption, 7.5μA at operation mode



Model No.	VDD (V)	Internal Clock (Hz)	LCD (com x seg)	LED Driver	VLCD Charge pump	LCD Mode	LCD Bias	LCD Duty	Serial Interface	Package
HY2613B	2.4~5.5	33K	4x36	-	-	Low Side	1/2, 1/3	1/4	I ² C Slave	TSSOP48 LQFP48
HY2613C	2.4~5.5	33K	4x32	Yes	Yes	High Side	1/2, 1/3	1/4	I ² C Slave	TSSOP48 LQFP48

Development Kit

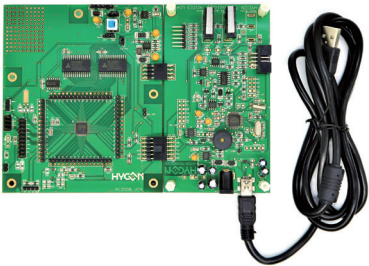
HY10S40-DK01



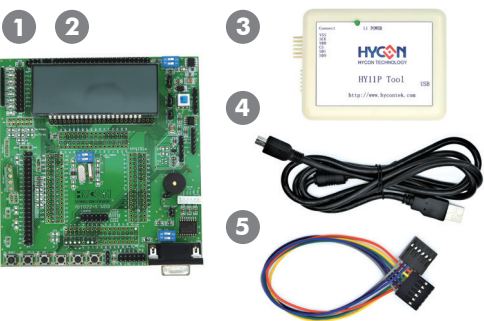
No.	Model No.	Description
1	HY10S00-IM01	HY10S40-L064 Target Board
2	HY10S00-CM01	HY10S40 Control Board
3	USB cable	USB Type A to Mini B Cable

Supported Model : HY10P Series

Assembly Drawing



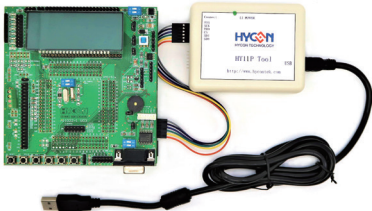
HY11S14-DK03/05



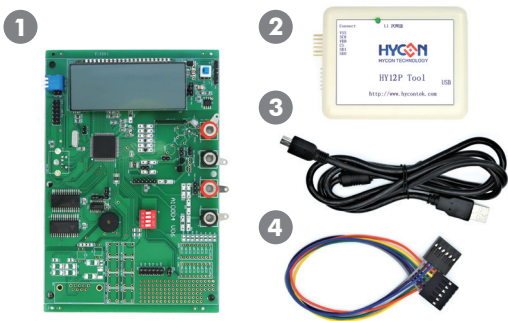
No.	Model No.	Description
1	HY11S14-IM03	HY11S14-L128 ICE Board
2	HY11S14-EM03	HY11S14 Target Board
3	HY11S14-CM03	HY11S14 Control Box
4	USB cable	USB Type A to Mini B Cable
5	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : DK03 for HY11P Series, except HY11P54
DK05 for HY11P32, HY11P33, HY11P36
HY11P52/52B, HY11P54

Assembly Drawing



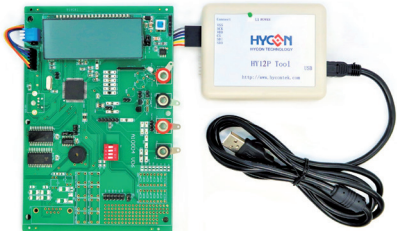
HY12S65-DK04



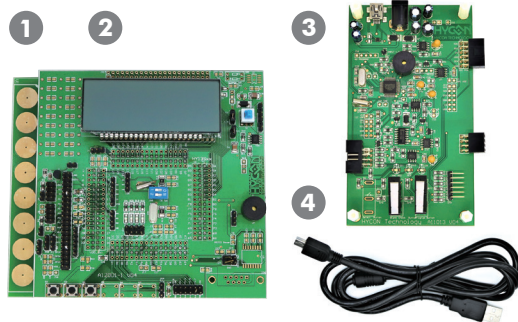
No.	Model No.	Description
1	HY12S65-IM03	HY12S65-L100 Target Board
2	HY12S65-CM03	HY12S65 Control Box
3	USB cable	USB Type A to Mini B Cable
4	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : HY12P Series

Assembly Drawing



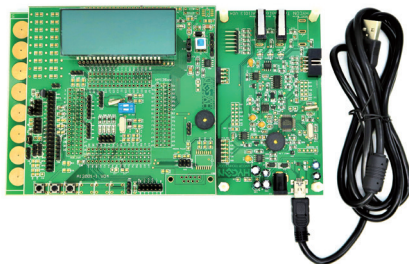
HY13S00-DK02



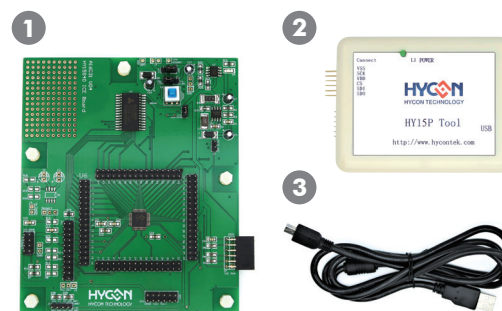
No.	Model No.	Description
1	HY13S00-IM02	HY13S00-L128 ICE Board
2	HY13S00-EM01	HY13S00 Target Board
3	HY13S00-CM02	HY13S00 Control Board
4	USB cable	USB Type A to Mini B Cable

Supported Model : HY13P Series

Assembly Drawing



HY15S41-DK01



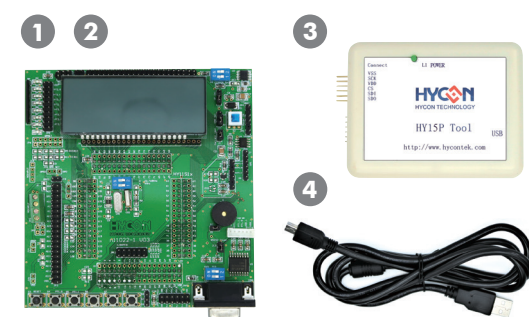
No.	Model No.	Description
1	HY15S41-IM01	HY15S41-L064 ICE Board
2	HY15000-CM02B	HY15S Control Box
3	Cable line	USB Type A to Mini B Cable

Supported Model : HY15P41 Series

Assembly Drawing



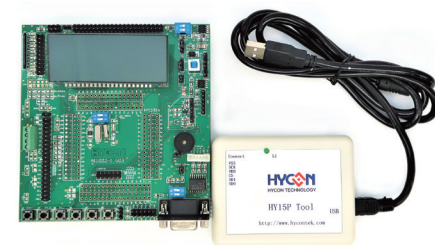
HY15S50-DK02B

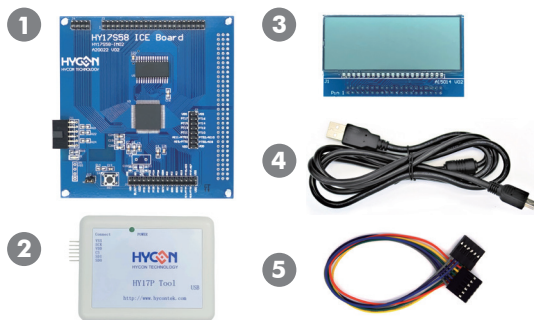


No.	Model No.	Description
1	HY15S50-IM01	HY15S50-L128 ICE Board
2	HY15S50-EM01	HY15S50 Target Board
3	HY15000-CM02B	HY15S Control Box
4	Cable line	USB Type A to Mini B Cable

Supported Model : HY15P53 & HY15P43 Series

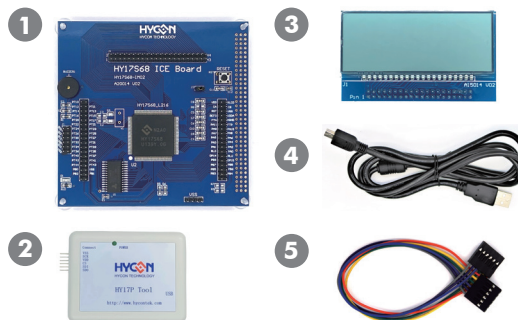
Assembly Drawing



HY17S58-DK02

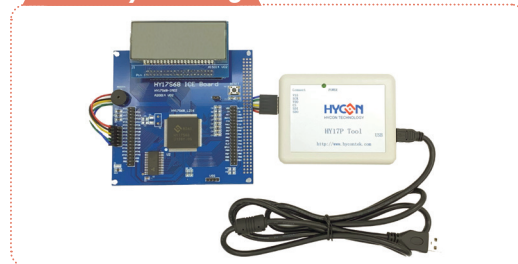
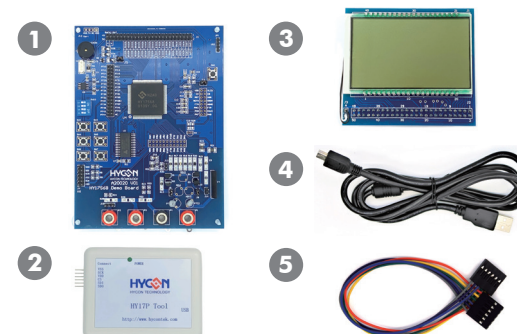
No.	Model No.	Description
1	HY17S58-IM02	HY17S58-L128 ICE Board
2	HY17000-CM01	HY17S58 Control Box
3	HY10000-AM01	LCD Board
4	Cable line	USB Type A to Mini B Cable
5	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : HY17P4x/5x Series

Assembly Drawing**HY17S68-DK02**

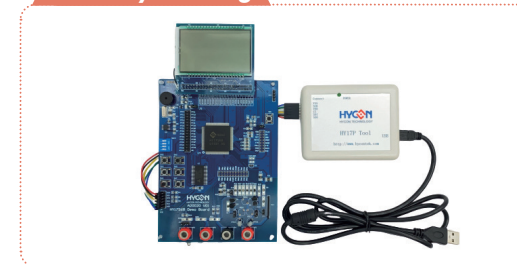
No.	Model No.	Description
1	HY17S68-IM02	HY17S68-L216 ICE Board
2	HY17000-CM01	HY17S68 Control Box
3	HY10000-AM01	LCD Board
4	Cable line	USB Type A to Mini B Cable
5	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : HY17P68 Series

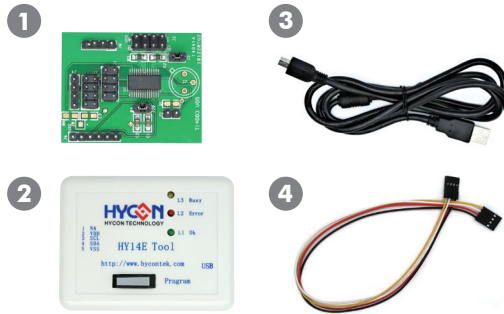
Assembly Drawing**HY17S68-DK03**

No.	Model No.	Description
1	HY17S68-IM03	HY17S68-L216 ICE Board
2	HY17000-CM01	HY17S68 Control Box
3	HY10000-AM02	LCD Board
4	Cable line	USB Type A to Mini B Cable
5	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : HY17P68 Series DMM Application

Assembly Drawing

HY14E00-DK01



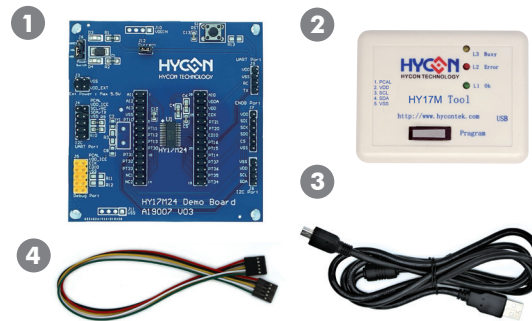
No.	Model No.	Description
1	HY14E00-IM01	HY14E00 ICE Board
2	HY14E00-CM01	HY14E00 Control Box
3	Cable line	USB Type A to Mini B Cable
4	Programming line	4pin/2.54 (2.54mm pitch)

Supported Model : HY14E10x Series

Assembly Drawing



HY17M24-DK01



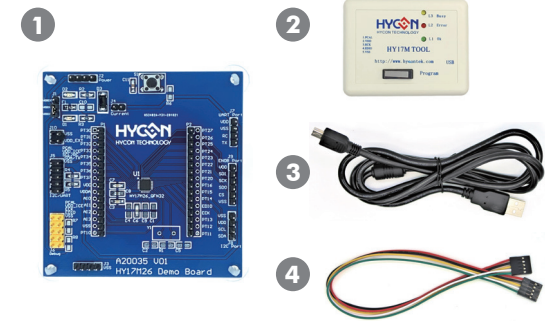
No.	Model No.	Description
1	HY17M24-AM01	HY17M24-ES28 Target Board
2	HY17M00-CM01	HY17M Series Control Box
3	Cable line	USB Type A to Mini B Cable
4	EDM line	5pin to 5pin (2.54mm pitch)

Supported Model : HY17M Series

Assembly Drawing



HY17M26-DK01



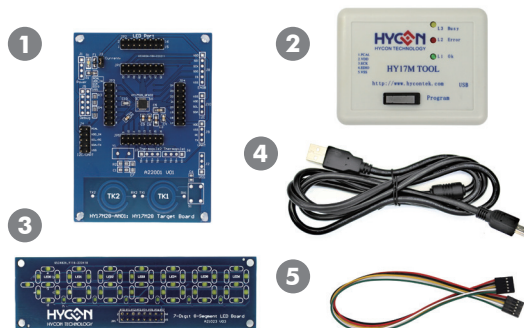
No.	Model No.	Description
1	HY17M26-AM01	HY17M26-NS32 ICE Board
2	HY17M00-CM01	HY17M Series Control Box
3	Cable line	USB Type A to Mini B Cable
4	EDM line	5pin to 5pin (2.54mm pitch)

Supported Model : HY17M Series

Assembly Drawing



HY17M28-DK01



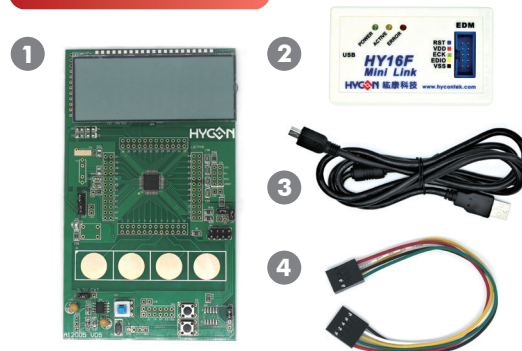
No.	Model No.	Description
1	HY17M28-AM01	HY17M28-NS32 ICE Board
2	HY17M00-CM01	HY17M Series Control Box
3	HY10001-AM01	LED Board
4	Cable line	USB Type A to Mini B Cable
5	EDM line	5pin to 5pin (2.54mm pitch)

Supported Model : HY17M Series

Assembly Drawing



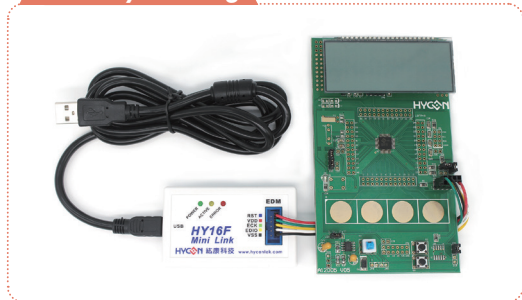
HY16F18X-DK04



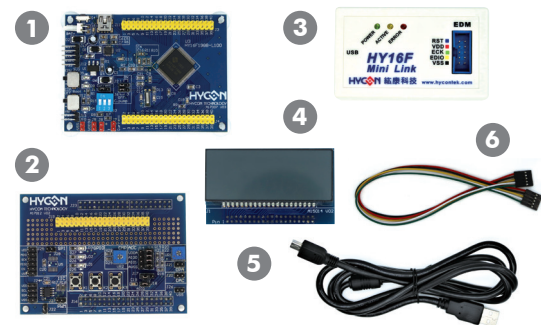
No.	Model No.	Description
1	HY16F00-IM02	HY16F188-L048 Target Board
2	HY16000-CM04	HY16F Mini Link debug tool
3	Cable line	USB Type A to Mini B Cable
4	EDM line	5pin to 4x2pin (2.54mm pitch)

Supported Model : HY16F18 Series

Assembly Drawing



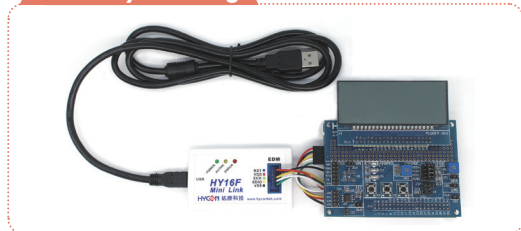
HY16F19X-DK05

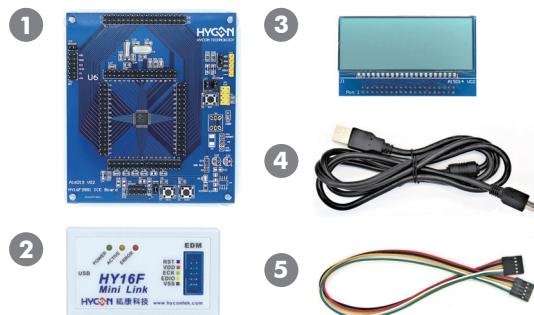


No.	Model No.	Description
1	HY16F19X-IM04	HY16F198B-L100 EV Board
2	HY16F19X-AM01	HY16F198B AP Board
3	HY16000-CM04	HY16F Mini Link debug tool
4	HY10000-AM01	LCD Board
5	Cable line	USB Type A to Mini B Cable
6	EDM line	5pin to 5pin (2.54mm pitch)

Supported Model : HY16F19 Series

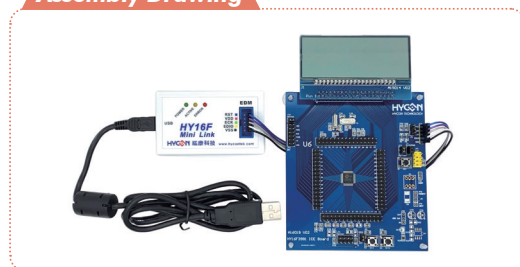
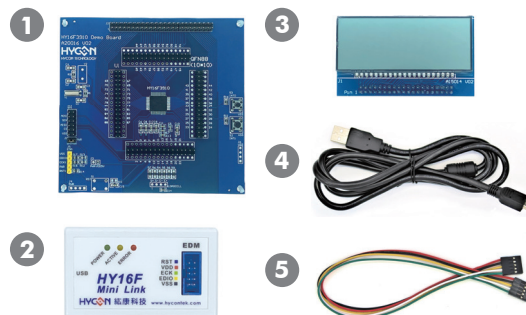
Assembly Drawing



HY16F3981-DK02

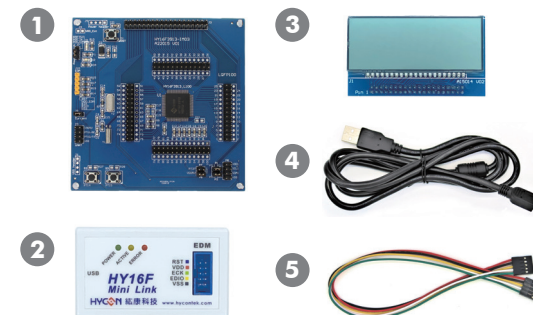
No.	Model No.	Description
1	HY16F3981-IM02	HY16F3981-L064 Target Board
2	HY16000-CM04	HY16F Mini Link debug tool
3	HY10000-AM01	LCD Board
4	Cable line	USB Type A to Mini B Cable
5	EDM line	5pin to 5pin (2.54mm pitch)

Supported Model : HY16F3981 Series

Assembly Drawing**HY16F3910-DK01**

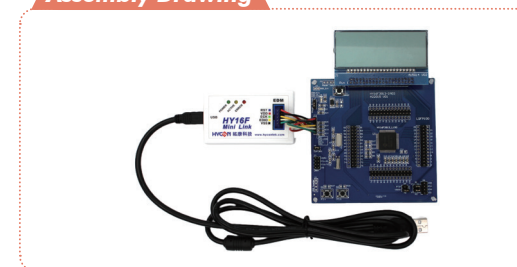
No.	Model No.	Description
1	HY16F3910-IM01	HY16F3910-N088 Target Board
2	HY16000-CM04	HY16F Mini Link debug tool
3	HY10000-AM01	LCD Board
4	Cable line	USB Type A to Mini B Cable
5	EDM line	5pin to 5pin (2.54mm pitch)

Supported Model : HY16F3910 Series

Assembly Drawing**HY16F3913-DK02**

No.	Model No.	Description
1	HY16F3913-IM03	HY16F3913-L100 Target Board
2	HY16000-CM04	HY16F Mini Link debug tool
3	HY10000-AM01	LCD Board
4	Cable line	USB Type A to Mini B Cable
5	EDM line	5pin to 5pin (2.54mm pitch)

Supported Model : HY16F3913 Series

Assembly Drawing

Writer Kit

HY4600-DK01



No.	Model No.	Description
1	HY4600-DK01	HY46xx Control Box
2	Cable line	USB Type A to Type B Cable

Supported Model : HY46xx Series

Assembly Drawing



HY10000-WK08D



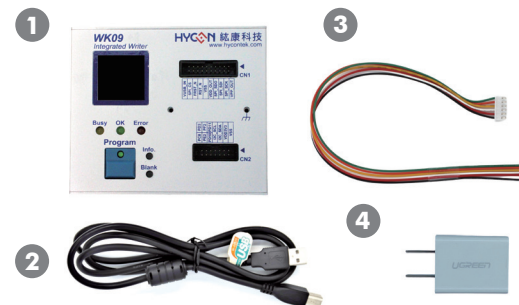
No.	Model No.	Description
1	HY10000-WK08D	Integrated Writer
2	Cable line	USB Type A to Mini B Cable
3	Programming line	6pin/2.0 (2.0mm pitch)
4	Programming line	4x2pin/2.54 (2.54mm pitch)
5	Power Supply	Output: DC 5V

Supported Model : HY10P Series, HY11P Series, HY12P Series
HY13P Series, HY15P Series, HY17P Series
HY16F Series(except HY16F391X)

Assembly Drawing



HY10000-WK09



No.	Model No.	Description
1	HY10000-WK09	Integrated Writer
2	Cable line	USB Type A to Type B Cable
3	Programming line	6pin (2.54mm pitch)
4	Power Supply	Output: DC 5V

Supported Model : HY16F Series, HY17P Series, HY17M Series

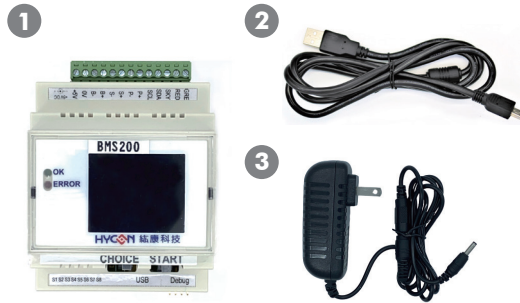
Assembly Drawing





ENOB Kit

HY40002-WK01



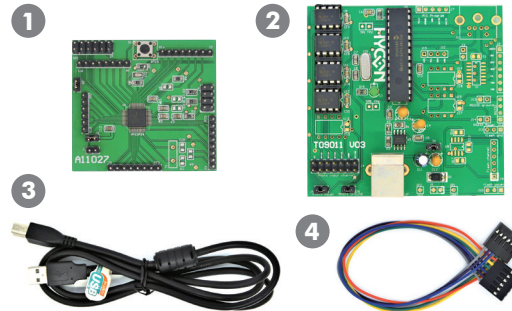
No.	Model No.	Description
1	HY40002-WK01	HY4143 & HY4145 series Writer
2	Cable line	USB Type A to Mini B Cable
3	Power Supply	Output: DC 5V

Supported Model : HY4143 & HY4145 Series

Assembly Drawing



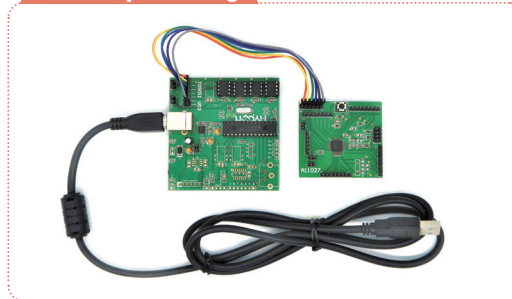
HY11P24-AK01



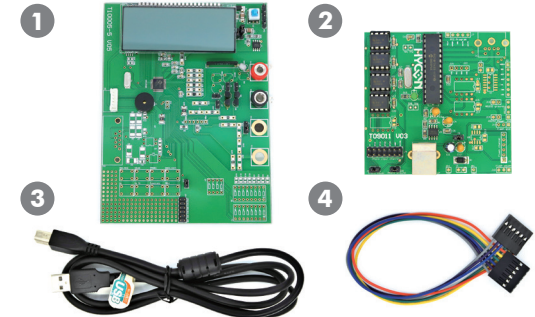
No.	Model No.	Description
1	HY11P24-AK01	HY11P24 Communication Board
2	HY11000-CM01	MSP ENOB Control Board
3	Cable line	USB Type A to Type B Cable
4	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : HY11P24 Series

Assembly Drawing



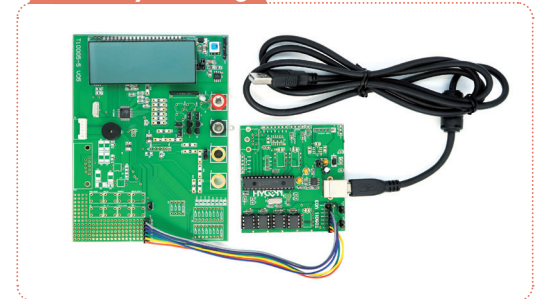
HY12P65-AK01



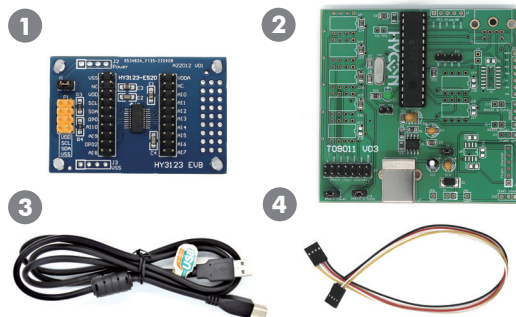
No.	Model No.	Description
1	HY12P65-AK01	HY12P65 Communication Board
2	HY11000-CM01	MSP ENOB Control Board
3	Cable line	USB Type A to Type B Cable
4	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : HY12P65 Series

Assembly Drawing



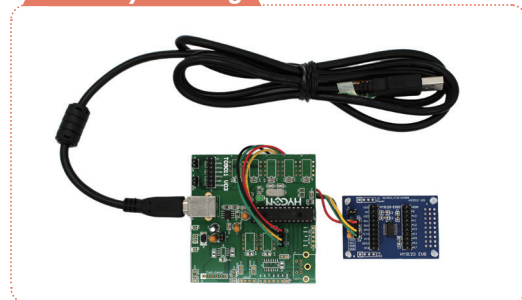
HY3123-AK02



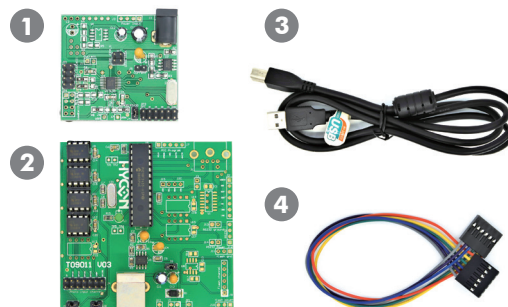
No.	Model No.	Description
1	HY3123-AM02	HY3123-ES20 Target Board
2	HY31200-CM01	HY312x ENOB Control Board
3	Cable line	USB Type A to Type B Cable
4	Interface line	4pin to 4pin (2.54mm pitch)

Supported Model : HY3123 Series

Assembly Drawing



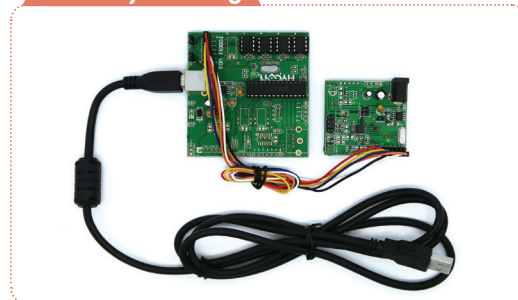
HY3106-AK01



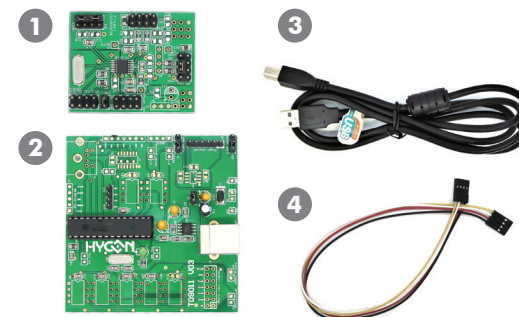
No.	Model No.	Description
1	HY3106-AK01	HY3106 Communication Board
2	HY31000-CM01	HY3106 ENOB Control Board
3	Cable line	USB Type A to Type B Cable
4	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : HY310x Series

Assembly Drawing



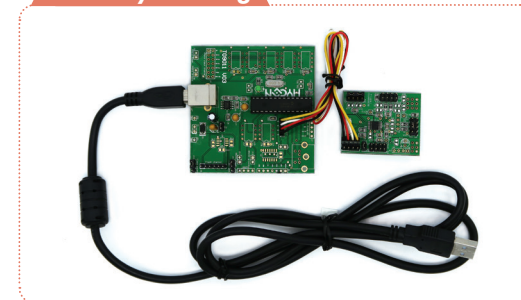
HY3118-AK01



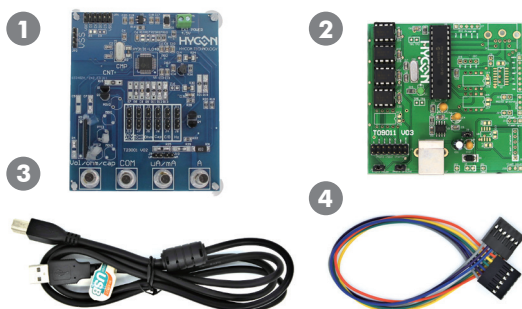
No.	Model No.	Description
1	HY3118-AK01	HY3118 Communication Board
2	HY31100-CM01	HY3118 ENOB Control Board
3	Cable line	USB Type A to Type B Cable
4	Interface line	4pin/2.54 (2.54mm pitch)

Supported Model : HY311x Series

Assembly Drawing



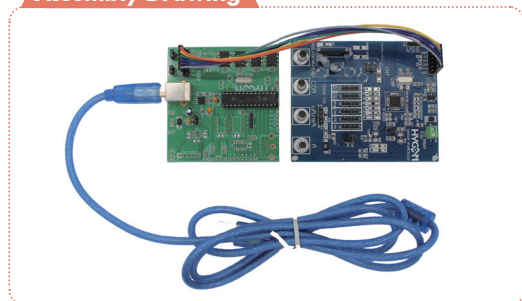
HY3131-AK02



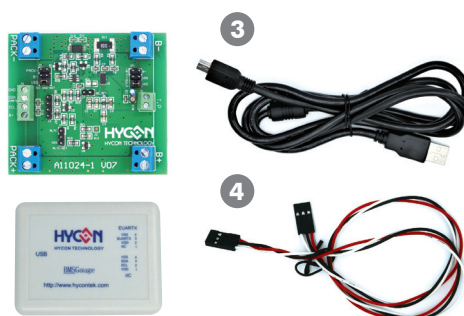
No.	Model No.	Description
1	HY3131-AM02	HY3131-L048 Target Board
2	HY31300-CM01	HY3131 ENOB Control Board
3	Cable line	USB Type A to Type B Cable
4	Interface line	6pin/2.54 (2.54mm pitch)

Supported Model : HY313x Series

Assembly Drawing



HY4145-AK01



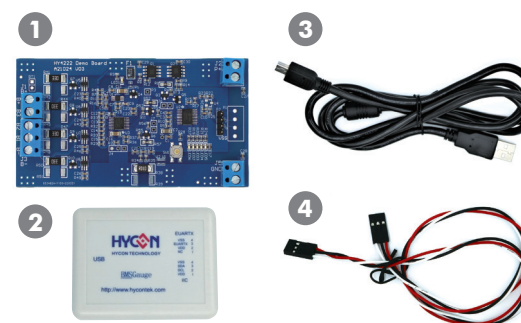
No.	Model No.	Description
1	HY4145-AM01	HY4145 Communication Board
2	HY40000-CM02	Gauge ENOB Control Box
3	Cable line	USB Type A to Mini B Cable
4	Interface line	3pin/2.54 (2.54mm pitch)

Supported Model : HY4145 Series

Assembly Drawing



HY4222-AK03



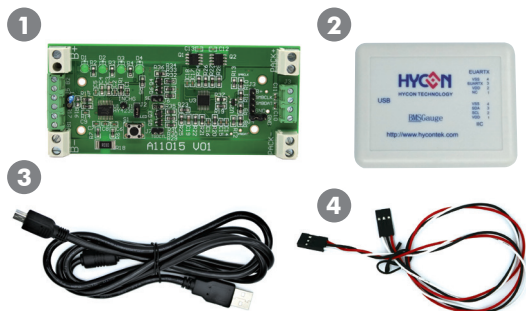
No.	Model No.	Description
1	HY4222-AM03	HY4222 Communication Board
2	HY40000-CM02	Gauge ENOB Control Box
3	Cable line	USB Type A to Mini B Cable
4	Interface line	3pin/2.54 (2.54mm pitch)

Supported Model : HY4222 Series

Assembly Drawing



HY4231-AK01



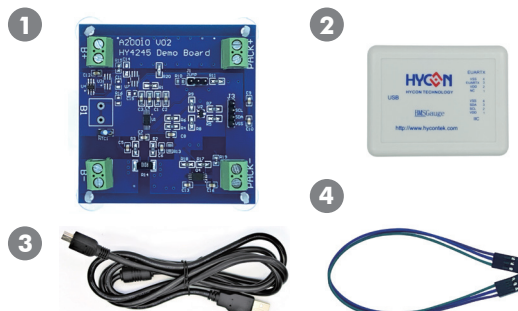
No.	Model No.	Description
1	HY4231-AM01	HY4231 Communication Board
2	HY40000-CM02	Gauge ENOB Control Box
3	Cable line	USB Type A to Mini B Cable
4	Interface line	3pin/2.54 (2.54mm pitch)

Supported Model :HY4231 Series

Assembly Drawing



HY4245-AK01



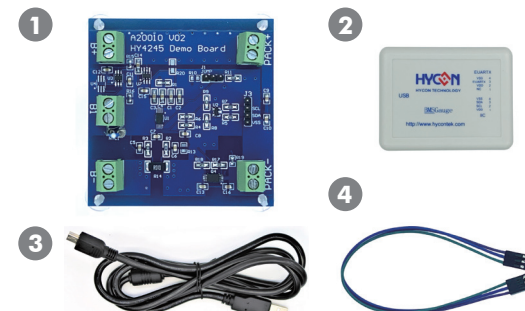
No.	Model No.	Description
1	HY4245-AM01	HY4245 Communication Board
2	HY40000-CM02	Gauge ENOB Control Box
3	Cable line	USB Type A to Mini B Cable
4	Interface line	3pin/2.54 (2.54mm pitch)

Supported Model :HY4245 Series

Assembly Drawing



HY4245-AK02



No.	Model No.	Description
1	HY4245-AM02	HY4245 Communication Board
2	HY40000-CM02	Gauge ENOB Control Box
3	Cable line	USB Type A to Mini B Cable
4	Interface line	3pin/2.54 (2.54mm pitch)

Supported Model :HY4245 Series

Assembly Drawing



Memo

