MH257 Hall-effect sensor is a temperature stable, stress-resistant, Low Tolerance of Sensitivity micro-power switch. Superior high-temperature performance is made possible through a dynamic offset cancellation that utilizes chopper-stabilization. This method reduces the offset voltage normally caused by device over molding, temperature dependencies, and thermal stress.

MH257 is special made for low operation voltage, 1.65V, to active the chip which is includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, CMOS output driver. Advanced CMOS wafer fabrication processing is used to take advantage of low-voltage requirements, component matching, very low input-offset errors, and small component geometries. This device requires the presence of unipolar magnetic fields for operation.

The package type is in a Halogen Free version has been verified by third party Lab.

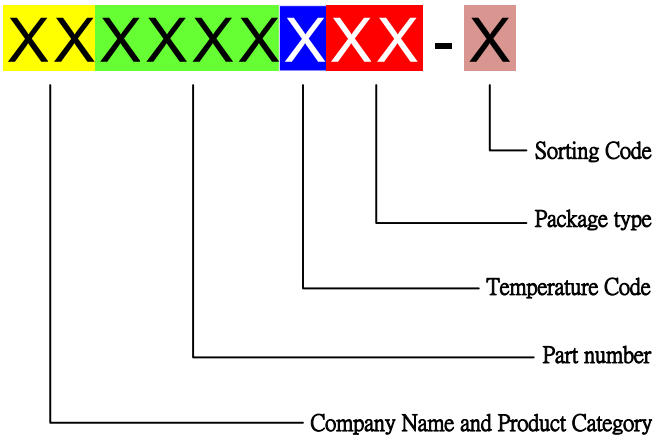
Features and Benefits

- CMOS Hall Effect IC
- Totem-pole output
- Omni polar output switch
- Micro-power consumption
- Low working voltage at 1.65V
- High ESD protection
- RoHS compliant 2011/65/EU and Halogen Free

Applications

- Solid state switch
- Handheld Wireless Handset Awake Switch (Flip Cell/PHS Phone/Note Book/Flip Video Set)
- Magnet proximity sensor for reed switch replacement in low duty cycle applications
- Water Meter
- PDA
- PDVD
- NB
- Pad PC

Ordering Information



Company Name and Product Category

MH:MST Hall Effect/MP:MST Power MOSFET

Part number

181,182,183,184,185,248,249,276,477,381,381F,381R,382…..

If part # is just 3 digits, the forth digit will be omitted.

Temperature range

E: 85 ℃, I: 105 ℃, K: 125 ℃, L: 150 ℃

Package type

UA:TO-92S,VK:TO-92S(4pin),VF:TO-92S(5pin),SO:SOT-23,

SQ:QFN-3,ST:TSOT-23,SN:SOT-553,SF:SOT-89(5pin)

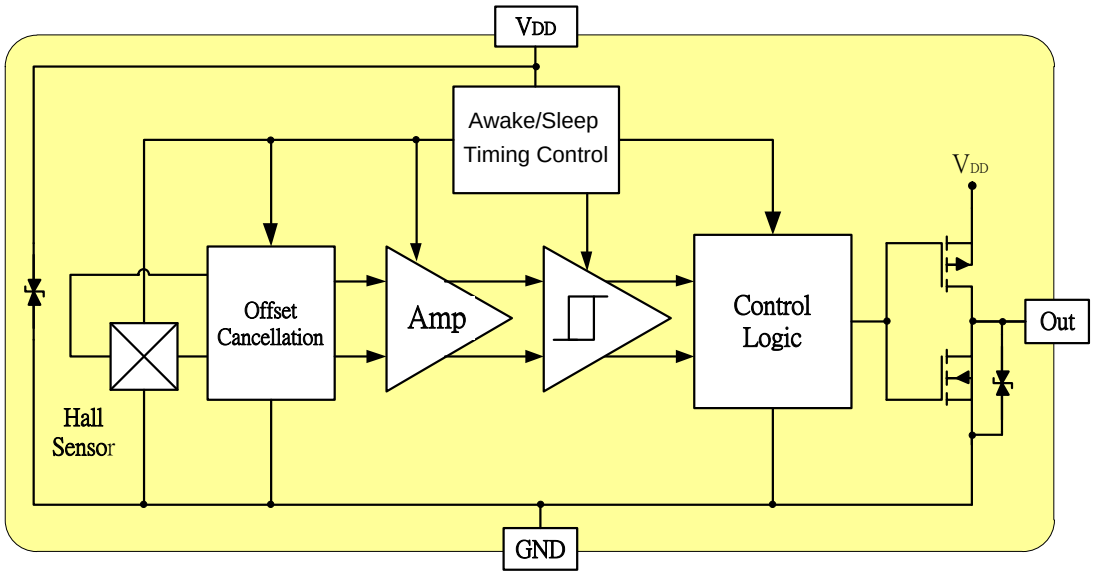
Sorting

α, β,Blank…..

Part No.	Temperature Suffix	Package Type
MH257EST	E (-40°C to + 85°C)	ST (TSOT-23)
MH257ESQ	E (-40°C to + 85°C)	SQ (QFN2020-3)
MH257EUA	E (-40°C to + 85°C)	UA (TO-92S)
MH257ESN	E (-40°C to + 85°C)	SN (SOT-553)

Custom sensitivity selection is available by MST sorting technology

Functional Diagram



***Note**: Static sensitive device; please observe ESD precautions. Reverse V_{DD} protection is not included. For reverse voltage protection, a 100Ω resistor in series with V_{DD} is recommended.*

MH257, HBM > ±4KV which is verified by third party lab.

Absolute Maximum Ratings *At(Ta=25℃)*

Characteristics		Values	Unit
Supply voltage,(V_{DD})		7	V
Output Voltage,(V_{out})		7	V
Reverse Voltage , (V_{DD}) (V_{OUT})		-0.3	V
Magnetic flux density		Unlimited	Gauss
Output current,(I_{OUT})		1	mA
Operating temperature range, (Ta)		-40 to +85	℃
Storage temperature range, (Ts)		-65 to +150	℃
Maximum Junction Temp,(Tj)		150	℃
Thermal Resistance	(θ_{JA}) ST/SQ/UA/SN	310/540/206/540	℃/W
	(θ_{JC}) ST/SQ/UA/SN	223/390/148/390	℃/W
Package Power Dissipation, (P_D) ST/SQ/UA/SN		400/230 /606/230	mW

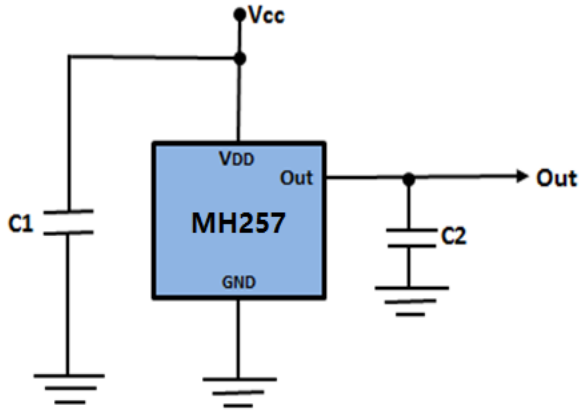
Note: *Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.*

Electrical Specifications

DC Operating Parameters ：Ta=25℃, V_{DD}=2.0V

Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage,(V_{DD})	Operating	1.65		6	Volts
Supply Current,(I_{DD})	Awake State		1.4	3	mA
	Sleep State		3.5	7	μA
	Average		5	10	μA
Output Leakage Current,(I_{off})	Output off			1	uA
Output High Voltage,(V_{OH})	I_{OUT}=0.5mA(Source)	V_{DD}-0.2			V
Output Low Voltage,(V_{OL})	I_{OUT}=0.5mA(Sink)			0.2	V
Awake mode time,(T_{aw})	Operating		40	80	uS
Sleep mode time,(T_{SL})	Operating		40	80	mS
Duty Cycle,(D,C)			0.1		%
Electro-Static Discharge	HBM	4			KV

Typical application circuit



C1：10nF

C2：100pF

MH257EST/SQ/UA Magnetic Specifications

DC Operating Parameters ：Ta=25 ℃, V_{DD}=2.0V

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Operating Point	B_{OP}	S pole to branded side, B > BOP, Vout On		30	50	Gauss
Release Point	B_{RP}	S pole to branded side, B < BRP, Vout Off	10	20		Gauss
Hysteresis	B_{HY}	|BOPx - BRPx|		10		Gauss

MH257ESN Magnetic Specifications

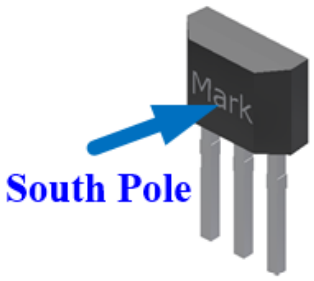
DC Operating Parameters ：Ta=25 ℃, V_{DD}=2.0V

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Operating Point	B_{OP}	N pole to branded side, B > BOP, Vout On	-50	-30		Gauss
Release Point	B_{RP}	N pole to branded side, B < BRP, Vout Off		-20	-10	Gauss
Hysteresis	B_{HY}	|BOPx - BRPx|		10		Gauss

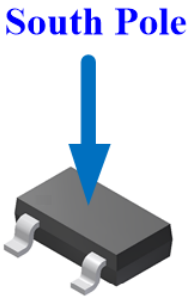
MH257EST/ESQ/ESN/EUA Output Behavior versus Magnetic Polar

DC Operating Parameters：Ta = -40 to 85 ℃, V_{DD} =1.65 to 6V

Parameter	Test condition	OUT(SN)	Parameter	Test condition	OUT(SQ/ST/UA)
Null or weak magnetic field	B=0 or B < BRP	High	**Null or weak magnetic field**	B=0 or B < BRP	High
North pole	B<Bop-N	Low	**South pole**	B>Bop -S	Low

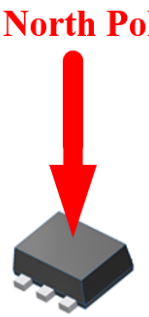


UA Package

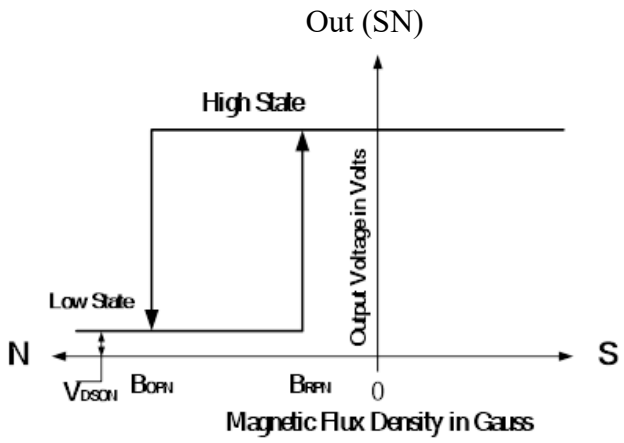


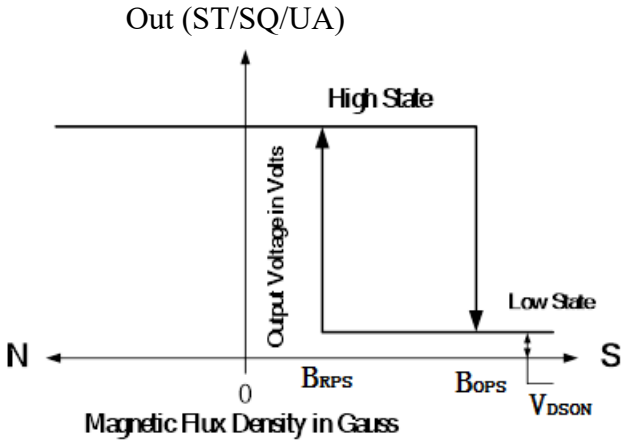
ST Package

SQ Package



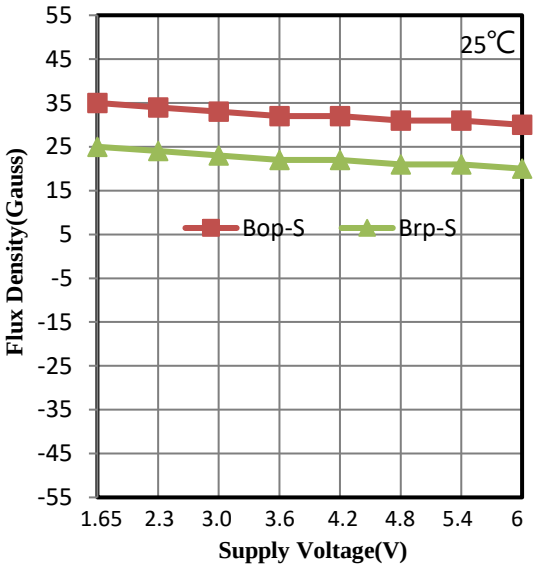
SN Package



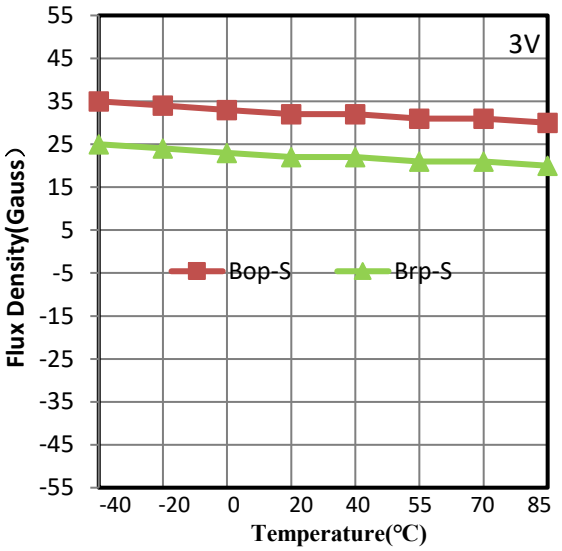


Performance Graph

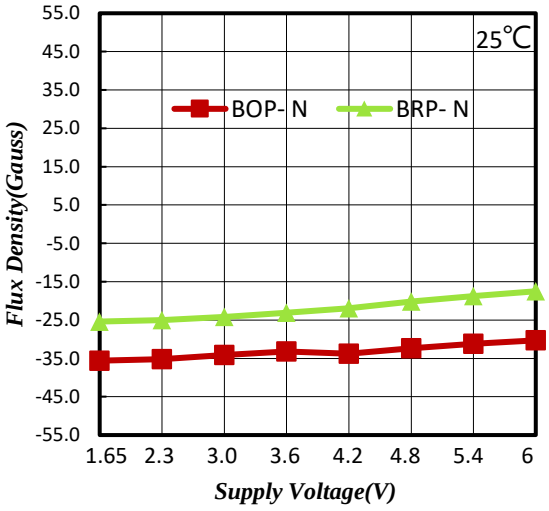
Typical Supply Voltage(V_{DD}) Versus Flux Density



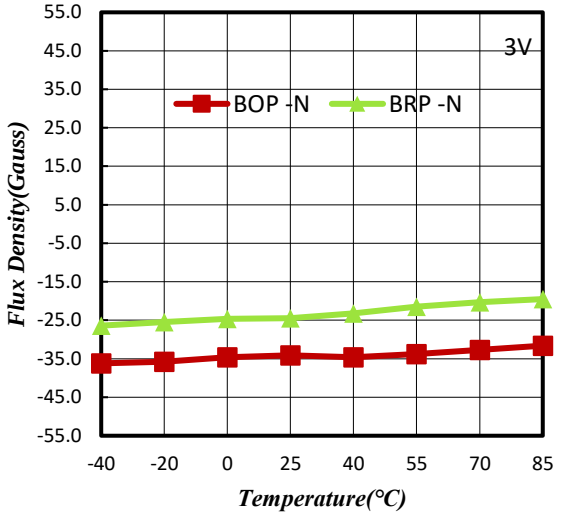
Typical Temperature (T_A) Versus Flux Density



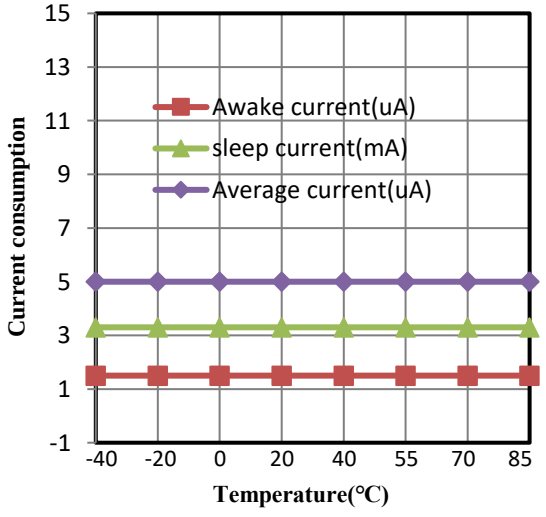
Typical Supply Voltage (V_{DD}) Versus Flux Density



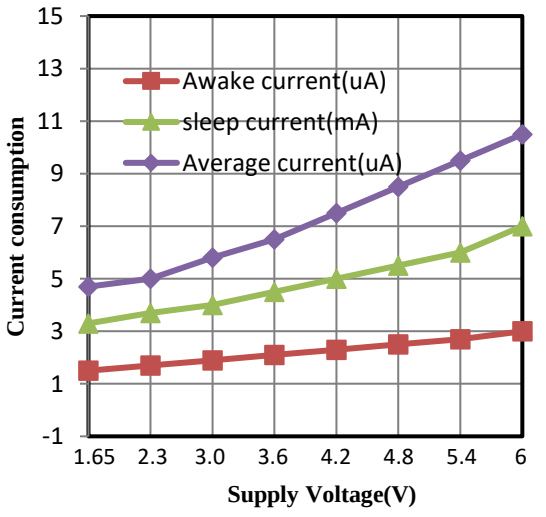
Typical Temperature (T_A) Versus Flux Density



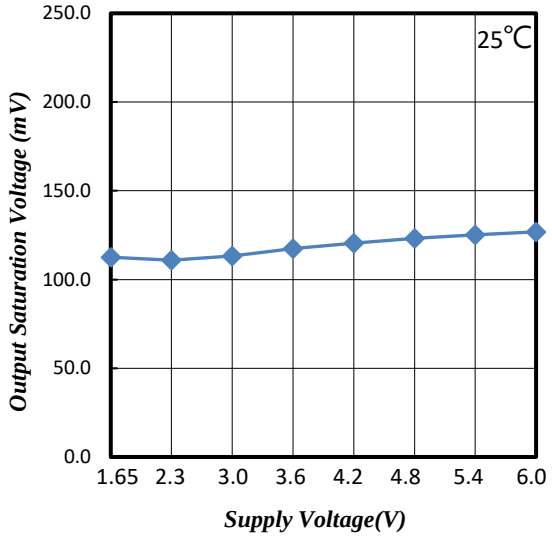
Typical Temperature(T_A) Versus Supply Current(I_{DD})



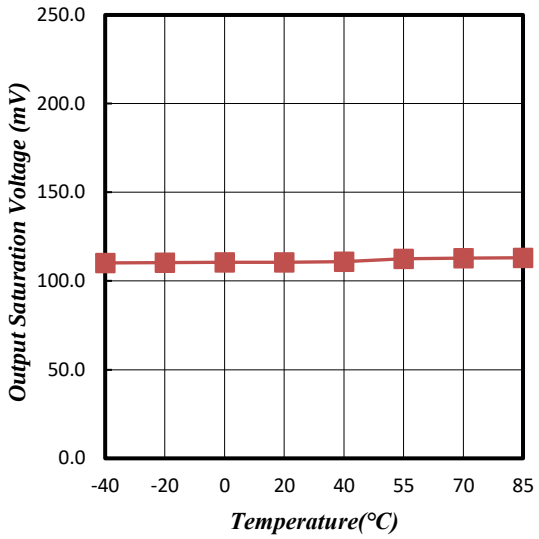
Typical Supply Voltage(V_{DD}) Versus Supply current current(I_{DD})



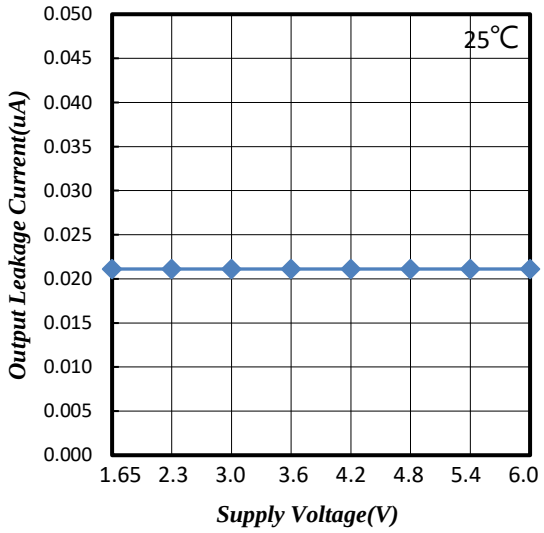
Typical Supply Voltage(V_{DD}) Versus Output Voltage(V_{DSON})



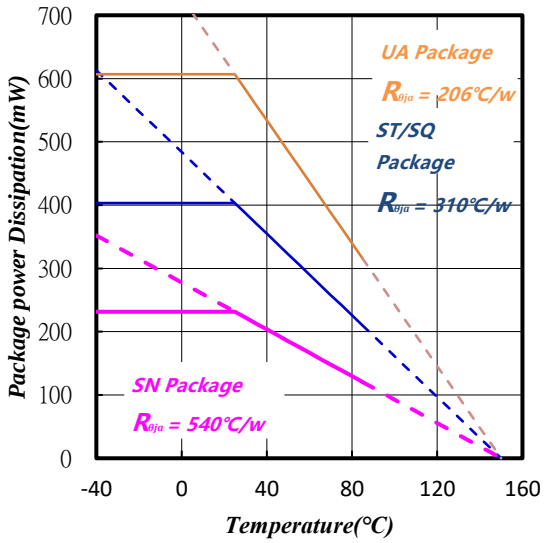
Typical Temperature (T_A) Versus Output Voltage(V_{DSON})



Typical Supply Voltage(V_{DD}) Versus Leakage Current(I_{OFF})



Power Dissipation versus Temperature(T_A)



Package Power Dissipation

The power dissipation of the Package is a function of the pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by $T_{J(max)}$, the maximum rated junction temperature of the die, $R_{\theta JA}$, the thermal resistance from the device junction to ambient, and the operating temperature, Ta. Using the values provided on the data sheet for the package, PD can be calculated as follows:

$$P_D = \frac{T_{J(max)} - Ta}{R_{\theta ja}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature Ta of 25°C, one can calculate the power dissipation of the device which in this case is 400 milliwatts.

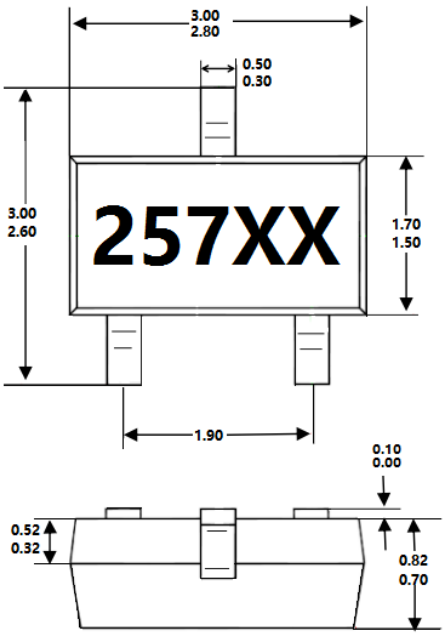
$$P_D(ST) = \frac{150°C - 25°C}{310°C/_W} = 400mW$$

The 310℃/W for the ST package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 400 milliwatts. There are other alternatives to achieving higher power dissipation from the Package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal Clad. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

Sensor Location, package dimension and marking

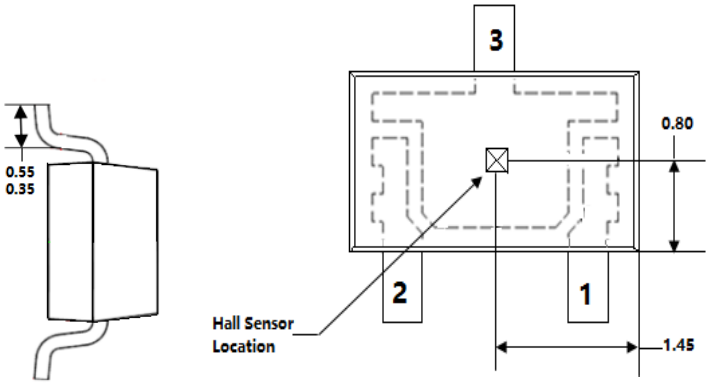
ST Package (TSOT-23)

(Top View)



Hall Plate Chip Location

(Bottom view)

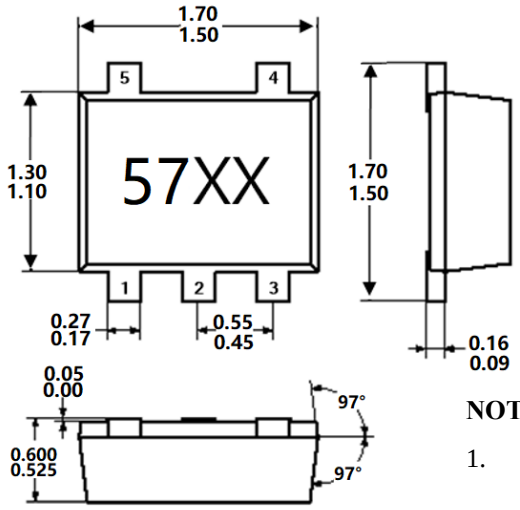


NOTES:

1. **PINOUT (See Top View at left:)**
   - **Pin 1 VDD**
   - **Pin 2 Output**
   - **Pin 3 GND**
2. **Controlling dimension: mm;**

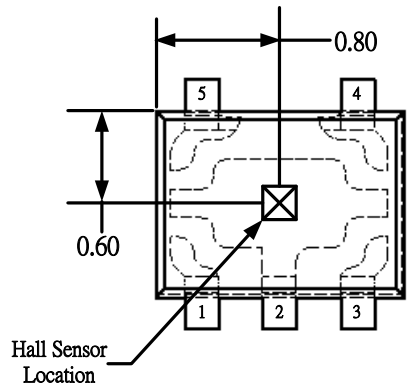
SN Package (SOT-553)

(Top View)



Hall Plate Chip Location

(Top View)

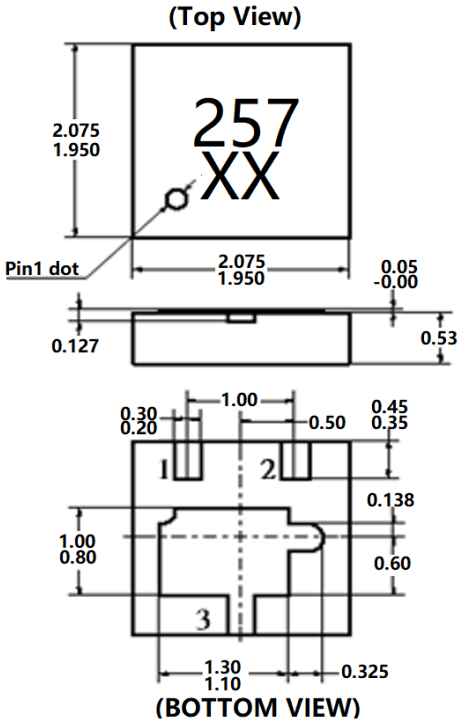


NOTES:

1. PINOUT (See Top View at left:)
   - Pin 1 NC
   - Pin 2 GND
   - Pin 3 NC
   - Pin 4 VDD
   - Pin 5 Out
2. Controlling dimension: mm;

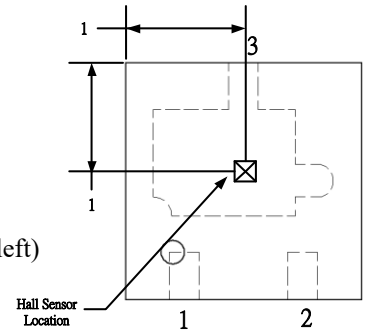
SQ Package (QFN2020-3)

(Top View)



Hall Plate Chip Location

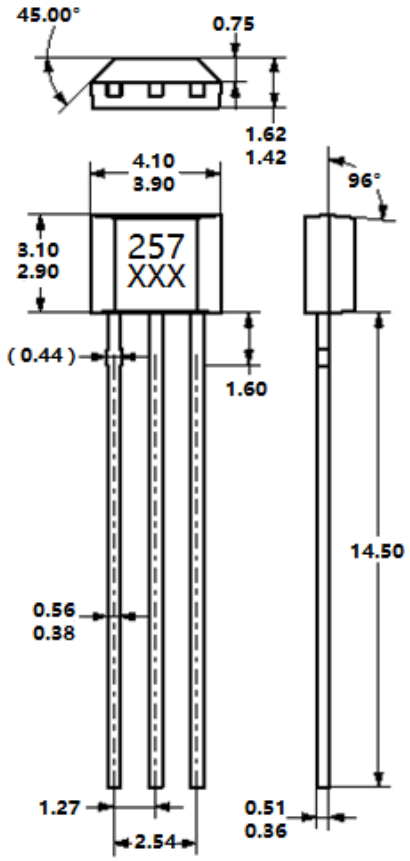
(Top view)



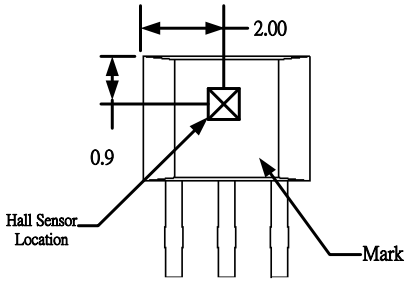
NOTES:

1. PINOUT (See Top View at left)
   - Pin 1 VDD
   - Pin 2 Output
   - Pin 3 GND
2. Controlling dimension: mm;
3. Chip rubbing will be 10mil maximum;
4. Chip must be in PKG. center.

UA Package (TO-92S)



Hall Chip location



NOTES:

1).Controlling dimension: mm

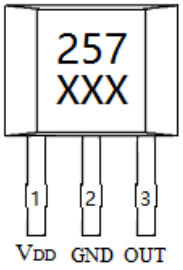
2).Leads must be free of flash and plating voids

3).Do not bend leads within 1 mm of lead to package interface.

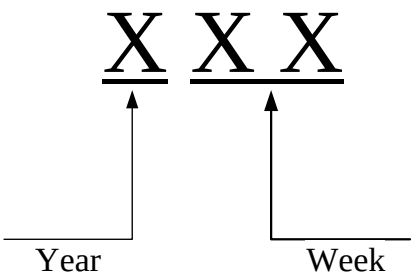
4).PINOUT:

Pin 1	V_{DD}
Pin 2	GND
Pin 3	Output

Output Pin Assignment (Top view)

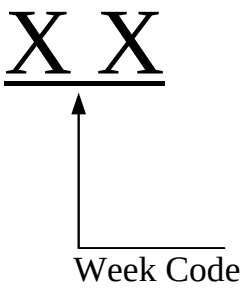


MH257 UA(TO-92S) Package Date Code



EX：2018 Year_8 Week →808

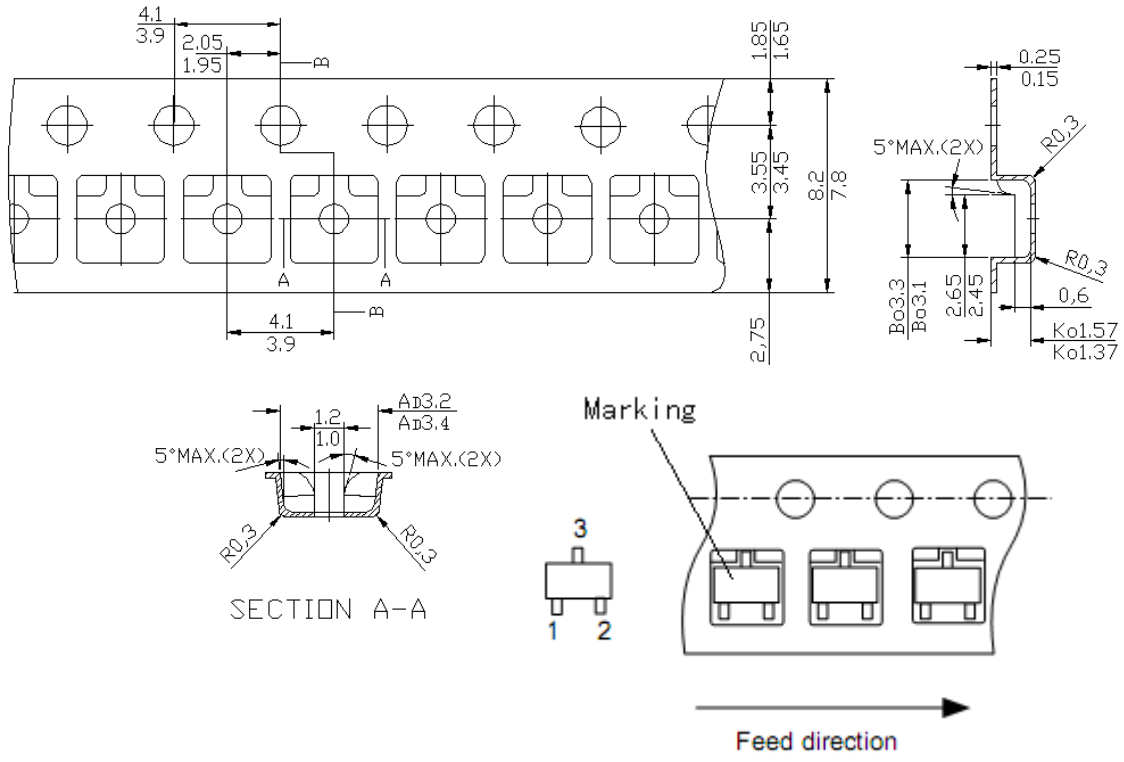
MH 257EST/SQ/SN Package Date Code

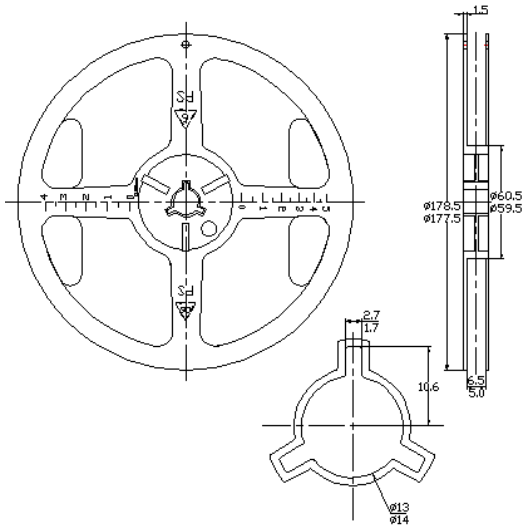


week	1	2	3	4	5	6	7	8	9	10	11	12	13
code	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM
week	14	15	16	17	18	19	20	21	22	23	24	25	26
code	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ
week	27	28	29	30	31	32	33	34	35	36	37	38	39
code	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM
week	40	41	42	43	44	45	46	47	48	49	50	51	52
code	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ

EX：2018Year_8 Week → AH

TSOT- 23 package Tape On Reel Dimension

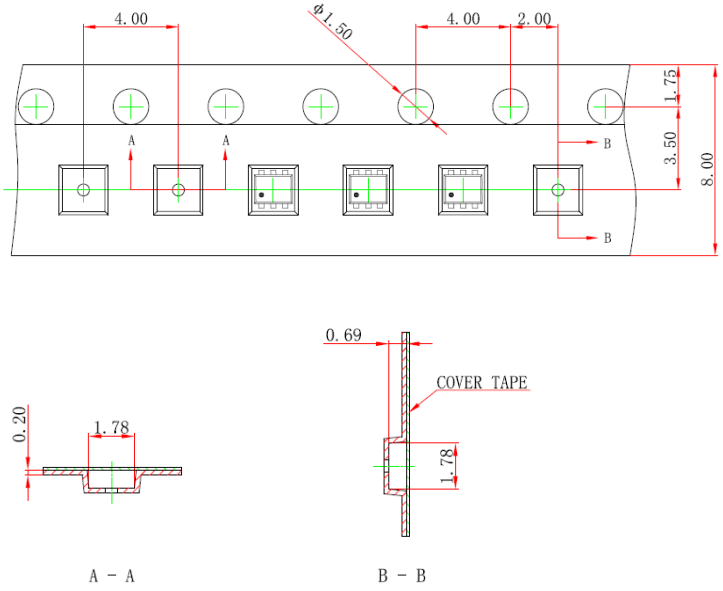




NOTES:

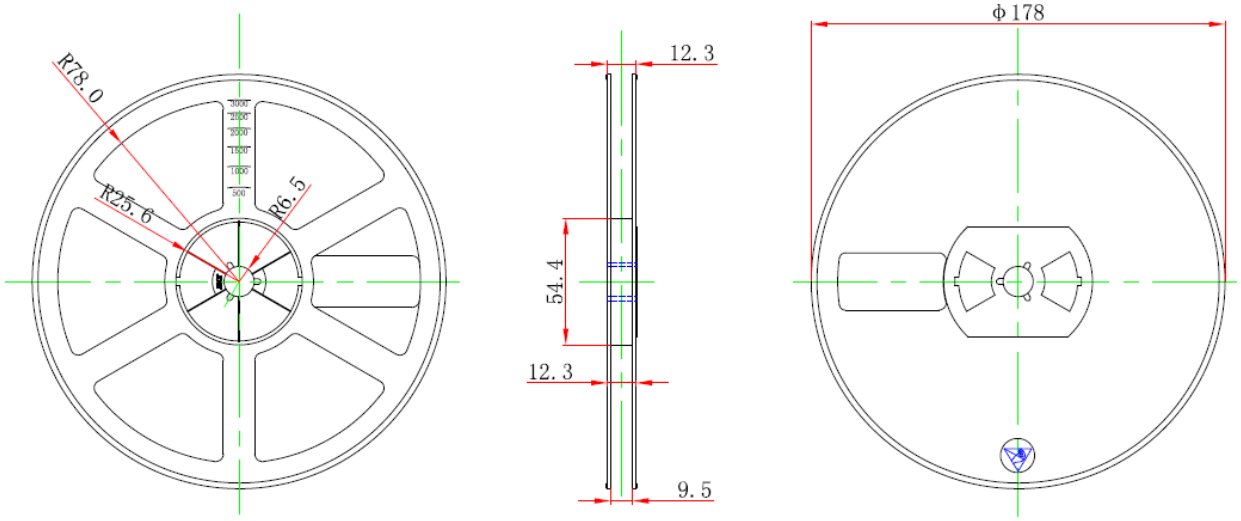
1. Material: Conductive polystyrene;
2. DIM in mm;
3. 10 sprocket hole pitch cumulative tolerance ±0.2;
4. Camber not to exceed 1mm in 100mm;
5. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole;
6. (S.R. OHM/SQ) Means surface electric resistivity of the carrier tape.

SOT-553 Tape On Reel Dimension

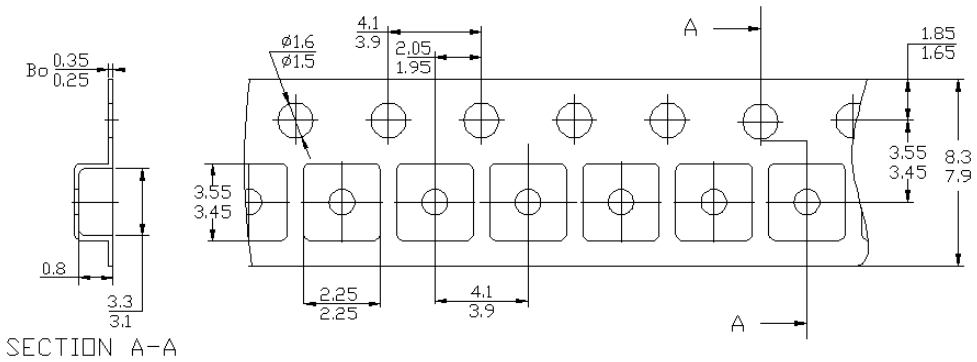


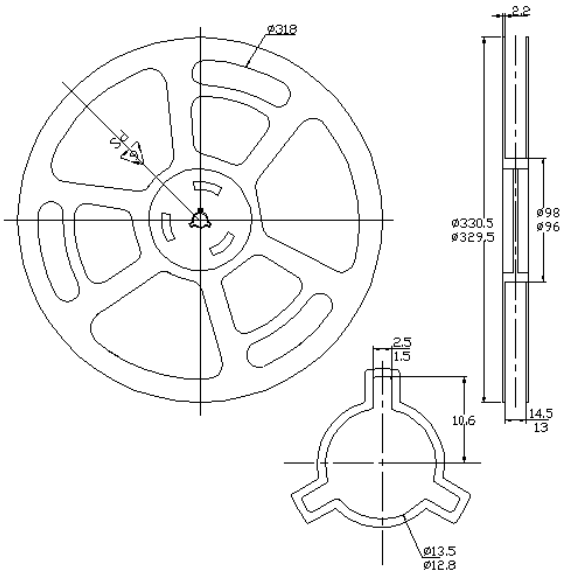
NOTES:

1. Material: Conductive polystyrene;
2. DIM in mm;
3. 10 sprocket hole pitch cumulative tolerance ±0.2;
4. Camber not to exceed 1mm in 100mm;
5. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole;
6. (S.R. OHM/SQ) Means surface electric resistivity of the carrier tape.



QFN2020-3 Tape On Reel Dimension

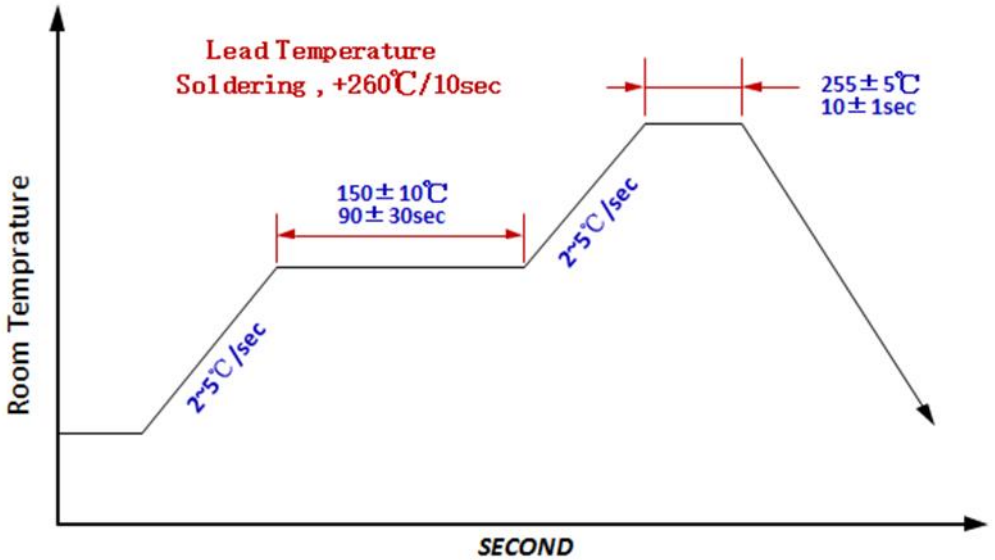




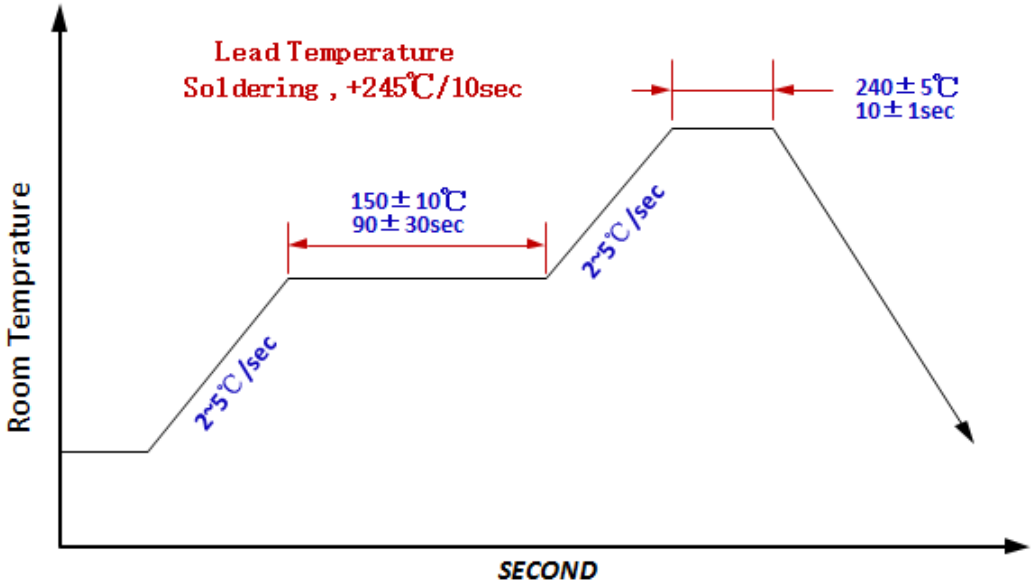
NOTES:

1. Material: Conductive polystyrene;
2. DIM in mm;
3. 10 sprocket hole pitch cumulative tolerance ±0.2;
4. Camber not to exceed 1mm in 100mm;
5. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole;
6. (S.R. OHM/SQ) Means surface electric resistivity of the carrier tape.

IR reflow curve



ST/SQ/SN Soldering Condition



UA Soldering Condition

Packing specification:

Package	Bag	Box	Carton
TSOT-23(ST)	3,000pcs/reel	10 reel/box	2 box/carton
SOT-553(SN)	3,000pcs/reel	10 reel/box	2 box/carton
TO-92S-3L(UA)	1,000pcs/bag	10bag/box	10 box/carton
QFN2020-3(SQ)	3,000pcs/reel	10 reel/box	2 box/carton

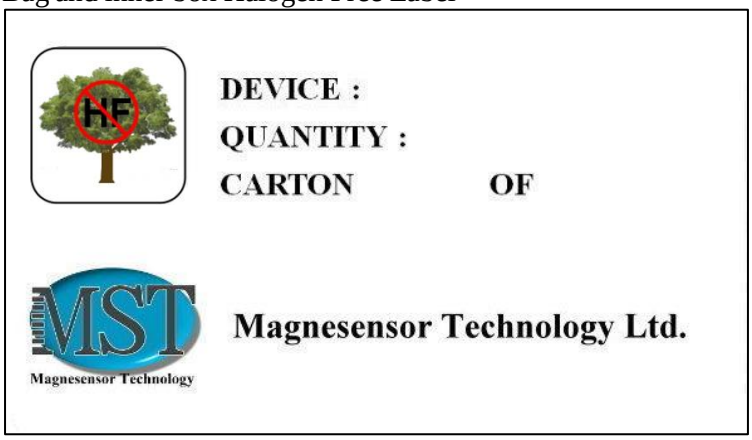
TSOT-23-3L	Weight	SOT-553(SN)	Weight	TO-92S-3L(UA)	Weight	QFN2020-3(SQ)	Weight
3000pcs/reel	0.18kg	3000pcs/reel	0.13kg	1000pcs/bag	0.11kg	3000pcs/reel	0.13kg
10 reels/box	1.99kg	10 reels/box	1.40kg	10bags/box	1.24kg	10 reels/box	1.40kg
2 boxes/carton	4.9kg	2 boxes/carton	3.70kg	10 boxes/carton	12.57kg	2 boxes/carton	3.70kg

ST/SN/SQ Package Inner box label ：Size:3.4cm*6.4cm
Bag and inner box Halogen Free Label

***ST /SN/SQ Carton label*：** Size:5.6cm* 9.8cm
Bag and inner box Halogen Free Label

***UA Package Inner box label*：** Size: 3.4cm*6.4cm
Bag and inner box Halogen Free Label

***UA Carton label*：** Size: 5.6 cm * 9.8 cm
Bag and inner box Halogen Free Label



Combine:
When combine lot, one reel could have two D/C and no more than two DC. One carton could have two devices, no more than two;