MH254 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.

MH254 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.

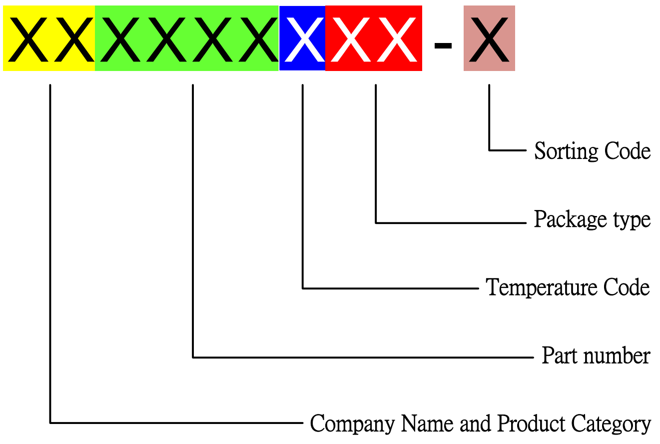
Features and Benefits

- CMOS Hall IC Technology
- Strong RF noise protection
- 1.65 to 6V for battery-powered applications
- Operation down to 1.65V, Unipolar Hall Switch Micro power consumption
- High Sensitivity for reed switch replacement applications
- Low sensitivity drift in crossing of Temp. range
- Ultra Low power consumption at 5uA (Avg)
- High ESD Protection, HBM > ±4KV(min)
- Totem-pole output

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)

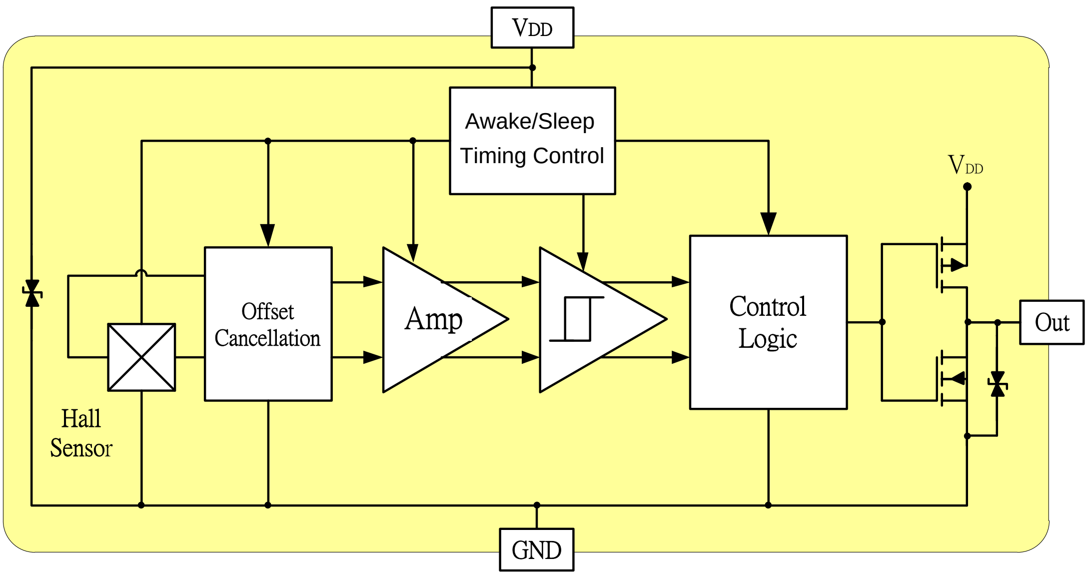
Sorting

α,β,Blank…..

Part No.	Temperature Suffix	Package Type
MH254ESQ	E (-40℃ to + 85℃)	SQ (DFN-2020)

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 100 Ω resistor in series with V_{DD} is recommended.*
MH254, 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}) SQ	540	℃/W
	(θ_{JC}) SQ	390	℃/W
Package Power Dissipation, (P_D) SQ		230	mW

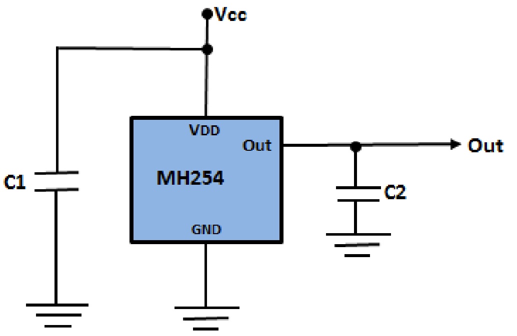
Note: *Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.*

Electrical Specifications

DC Operating Parameters ：Ta=25℃, V_{DD}=1.8V

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		3.6	7	μA
	Average		5	10	μA
Output Leakage	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

MH254ESQ Magnetic Specifications

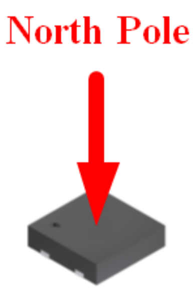
DC Operating Parameters ：Ta=25℃, V_{DD}=1.8V

Parameter	*Symbol*	*Test Conditions*	*Min.*	*Typ.*	*Max.*	*Units*
Operating Point	B_{OP}	N pole to branded side, B > BOP, Oout 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

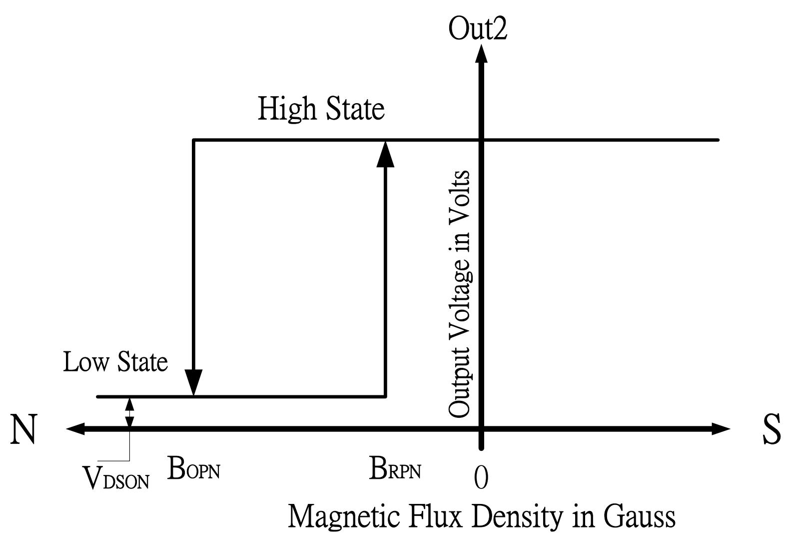
MH254ESQ Output Behavior versus Magnetic Polar

DC Operating Parameters ：Ta = -40 to 85℃, V_{DD} =1.8V to 6V

Parameter	*Test condition*	*OUT*
Null or weak magnetic field	B=0 or B < BRP	High
North pole	B>Bop(-55~-10)	Low

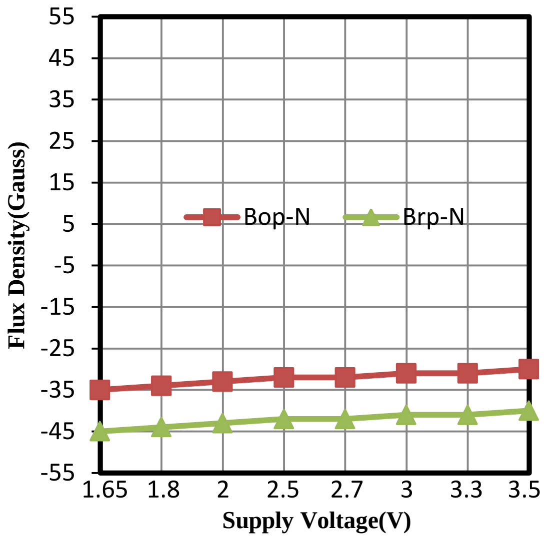


SQ Package

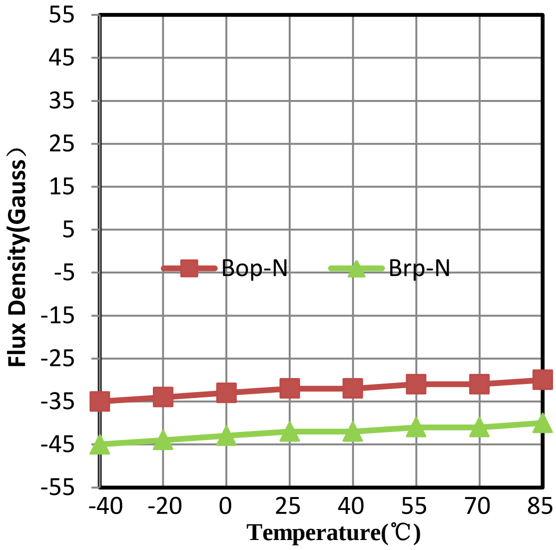


Performance Graph

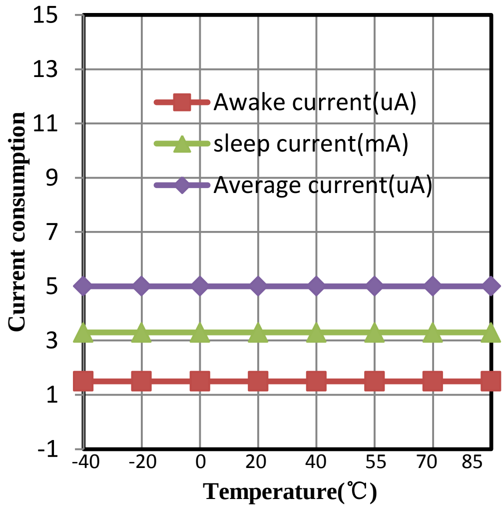
Typical Supply Voltage(V_{DD}) Versus Flux Density



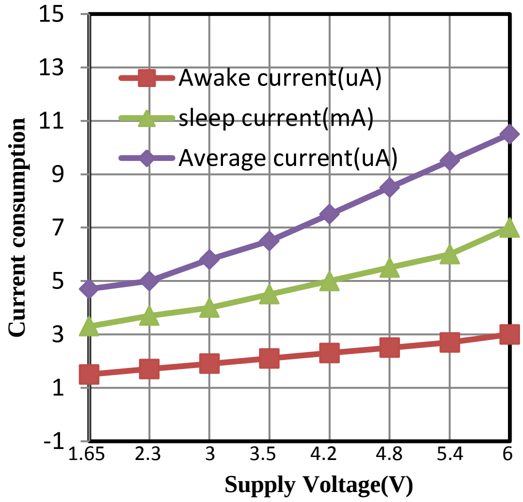
Typical Temperature(T_A) Versus Flux Density



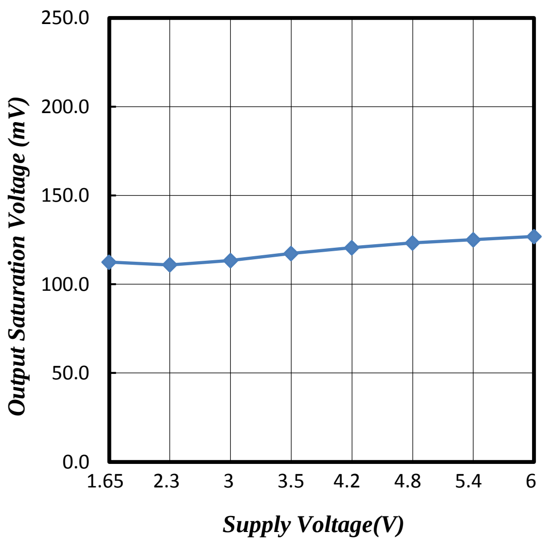
Typical Temperature(T_A) Versus Supply Current(I_{DD})



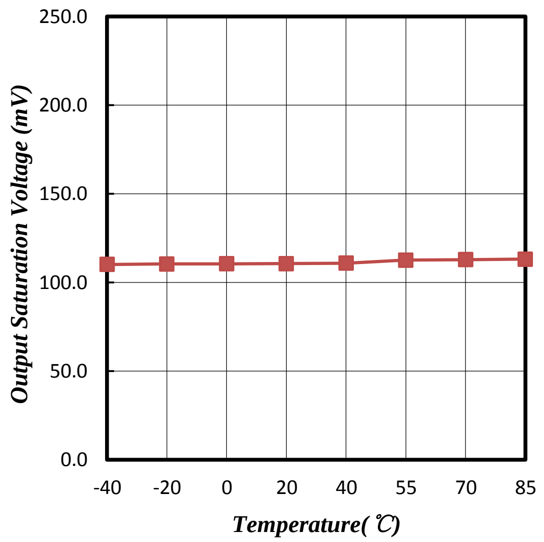
Typical Supply Voltage(V_{DD}) Versus Supply current current(I_{DD})



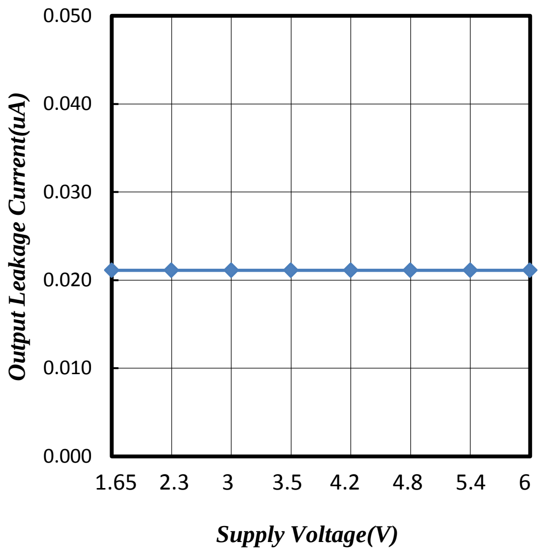
Typical Supply Voltage(V_{DD}) Versus Output Voltage(V_{DSON})



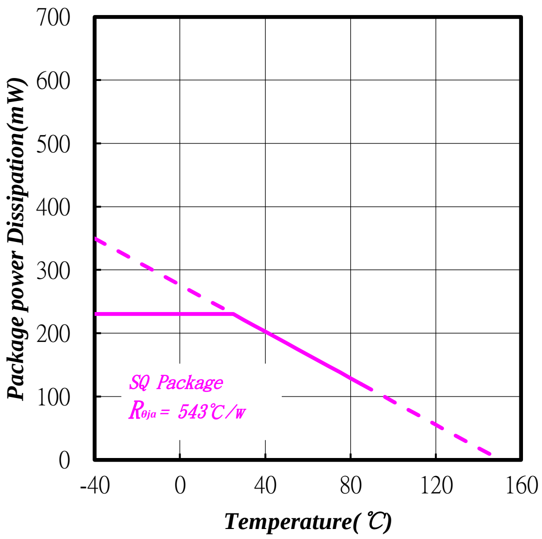
Typical Temperature(T_A) Versus Output Voltage(V_{DSON})



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℃, one can calculate the power dissipation of the device which in this case is 230 milliwatts.

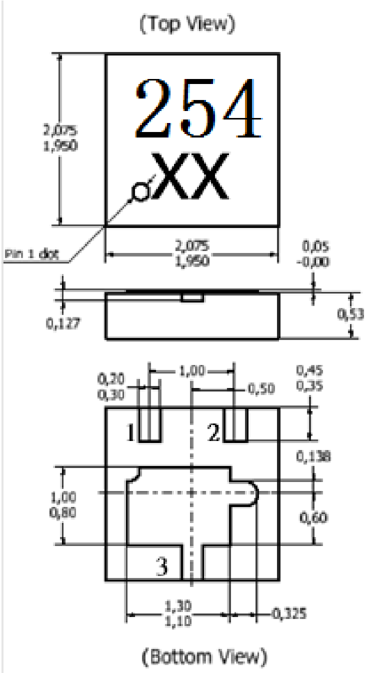
$$P_D(ST) = \frac{150°C - 25°C}{540°C/_W} = 230mW$$

The 540℃/W for the SN package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 230 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

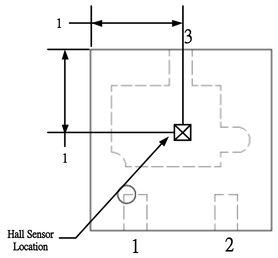
MH254ESQ Package

SQ Package



Hall Plate Chip Location

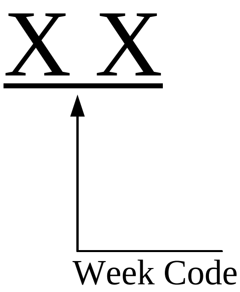
(Top view)



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.

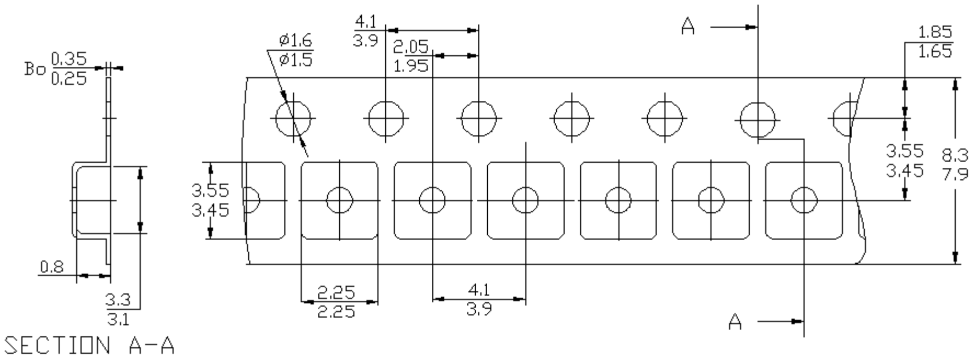
MH 254 SQ Package Date Code

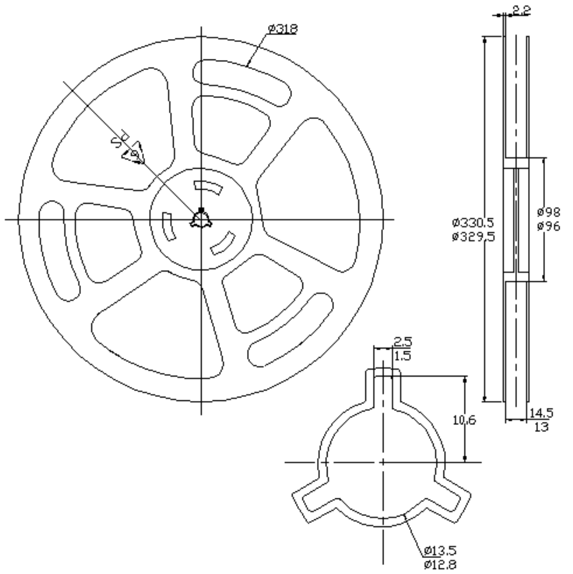


week	1	2	3	4	5	6	7	8	9	10	11	12	13
code	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM
week	14	15	16	17	18	19	20	21	22	23	24	25	26
code	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ
week	27	28	29	30	31	32	33	34	35	36	37	38	39
code	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM
week	40	41	42	43	44	45	46	47	48	49	50	51	52
code	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX	TY	TZ

EX：2014 Year_8 Week → SH

QFN2020-3 Tape On Reel Dimension

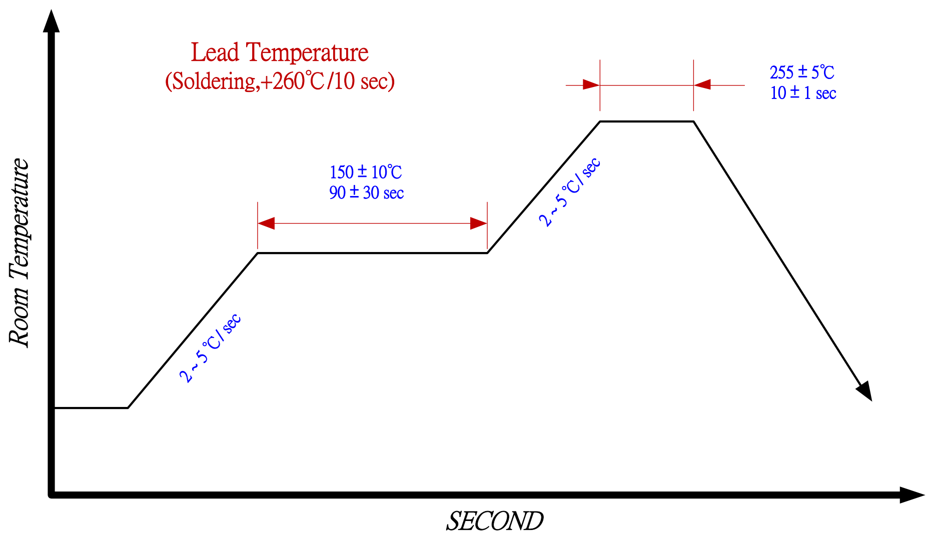




NOTES:

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



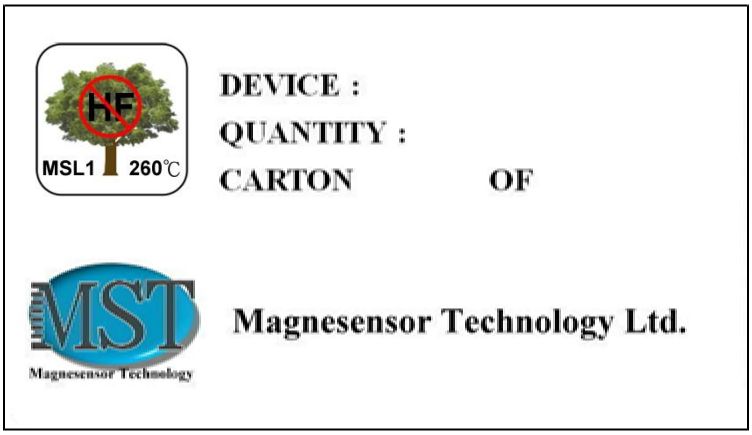
ST Soldering Condition

Packing specification:

Package	Reel	Box	Carton
QFN2020-3	3,000pcs/reel	10 reel/box	2 box/carton
Weight	0.13kg	1.4kg	3.7kg

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

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;

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