单极性低功耗霍尔开关--HEX-454

目录

(一) Product introduction 产品介绍

HEX454 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.

HEX454is 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.

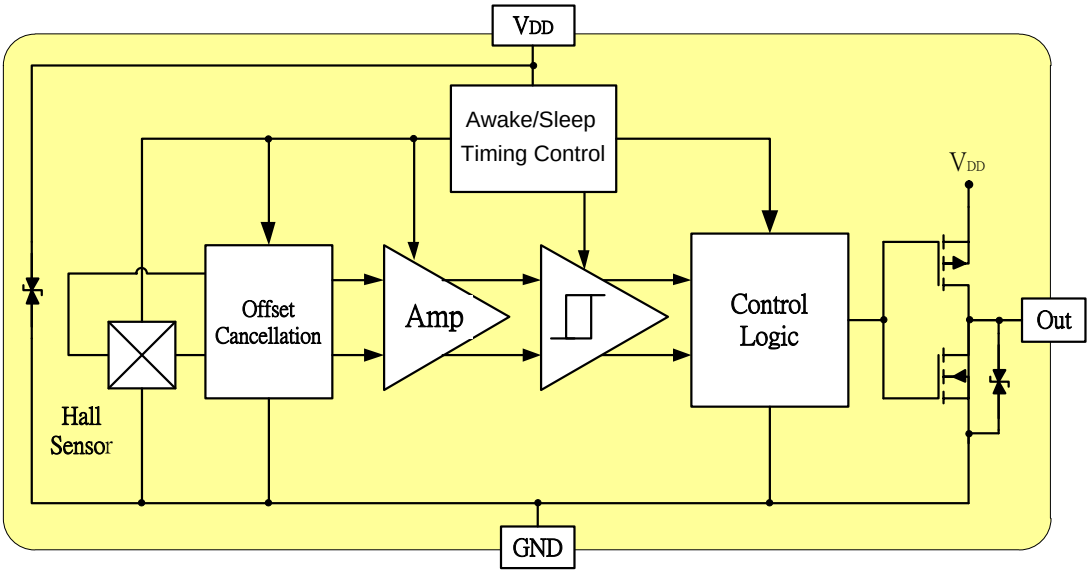
(二) Features and Benefits 优点和缺点

- 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

(三) Application 产品运用

- 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

（四）Functional Diagram 功能图



Part No.	Temperature Suffix	Package Type
HEX454	E:-40°C+85°C	ST （SOT-23）
HEX454ESQ	E:-40°C+85°C	SQ （DFN-2020）

（五）Product utilization parameter 产品运用参数

1.绝对最大额定参数

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}) VK / SN	227 / 540	℃/W
	(θ_{JC}) VK / SN	49 / 390	℃/W
Package Power Dissipation, (P_D) VK / SN		550 / 230	mW

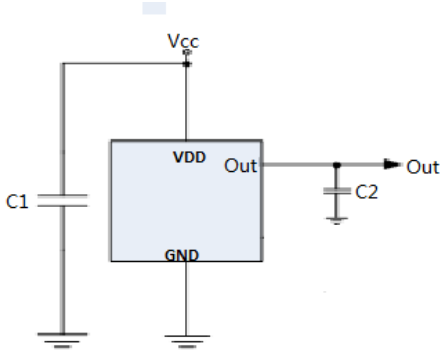
注:超过绝对最高等级可能会造成永久性伤害。在长时间暴露在绝对轴额定条件下可能会影响设备的可靠性。

2.电气规格

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

3.典型应用电路图



C1：10nF
C2：100pF
C3：100pF

HEX454EST Magnetic Specifications

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

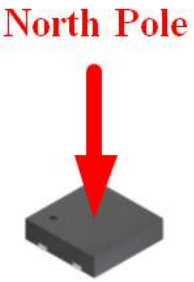
Parameter	*Symbol*	*Test Conditions*	*Min.*	*Typ.*	*Max.*	*Units*
Operating Point	B_{OP}	N pole to branded side, B > BOP, OUT1 On	-50	-30		Gauss
Release Point	B_{RP}	N pole to branded side, B < BRP, Vout Off		-20	-10	Gauss
Hysteresis	B_{HY}	|BOPx - BRPx|		10		Gauss

HEX454EST Output Behavior versus Magnetic Polar

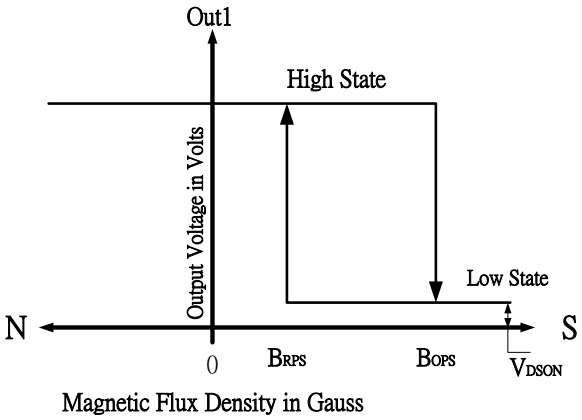
DC Operating Parameters：Ta = -40 to 85℃, V_{DD} =1.8V to 6 V

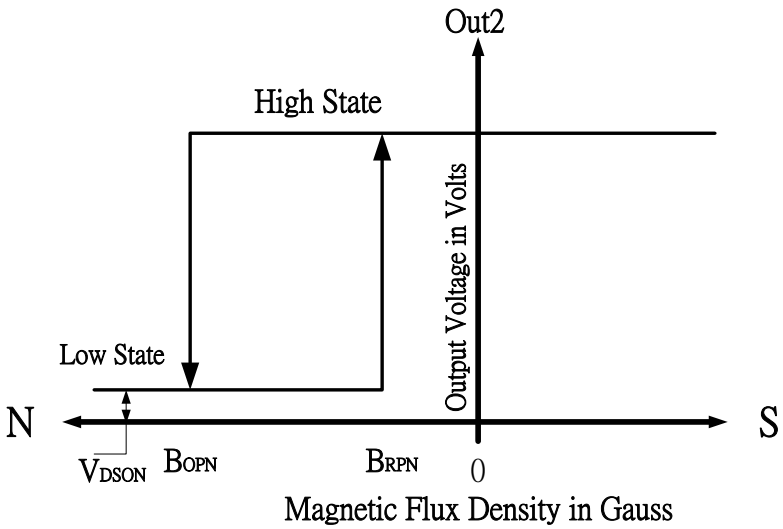
Parameter	*Test condition*	*OUT1*
Nouth pole	B>Bop[(55)~(-10)]	Low
Null or weak magnetic field	B=0 or B < BRP	High
North pole	B>Bop(55~10)	High

ST Package



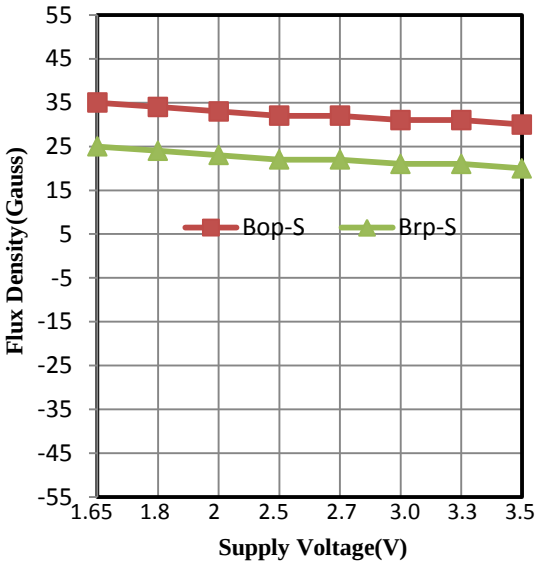
SQ Package

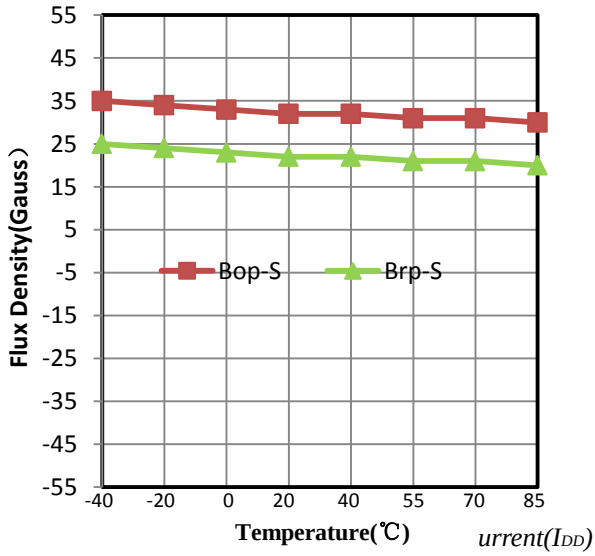




Performance Graph

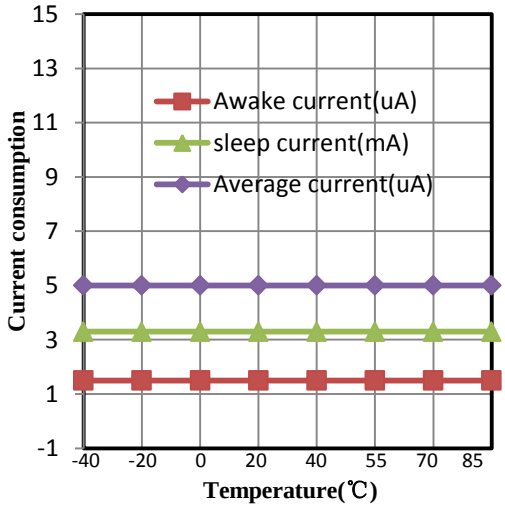
Typical Supply Voltage(V_{DD}) Versus Flux Density



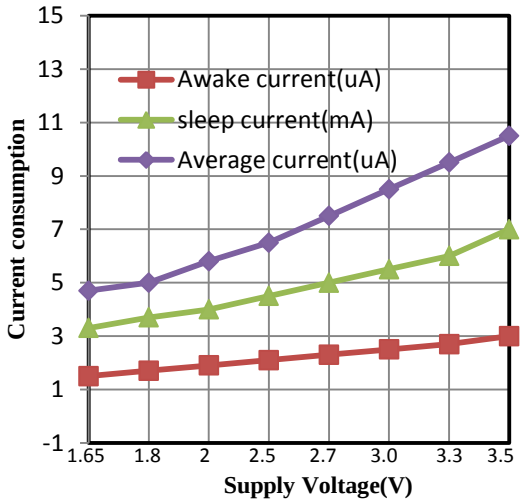


urrent(I_{DD})

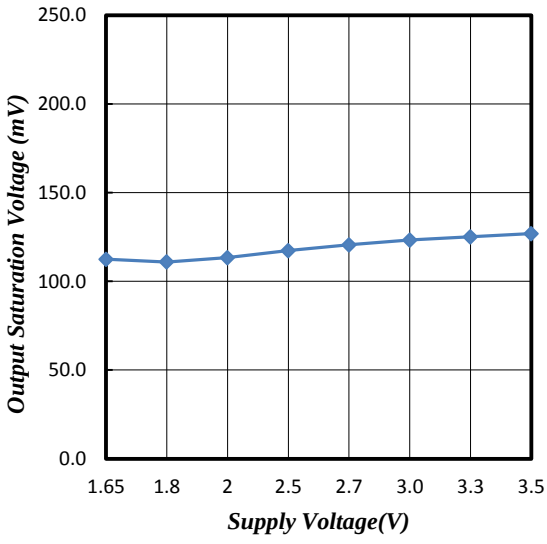
Typical Temperature(T_A) Versus Supply Current(I_{DD})



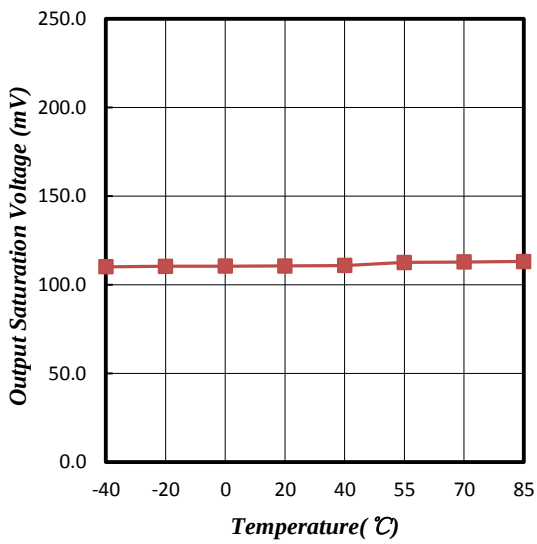
Typical Supply Voltage(V_{DD}) Versus Supply current c



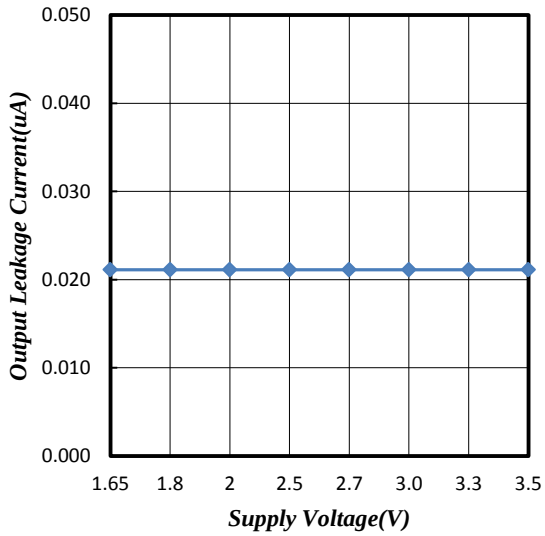
Typical Supply Voltage(V_{DD}) Versus Output Voltage(V_{DSON})



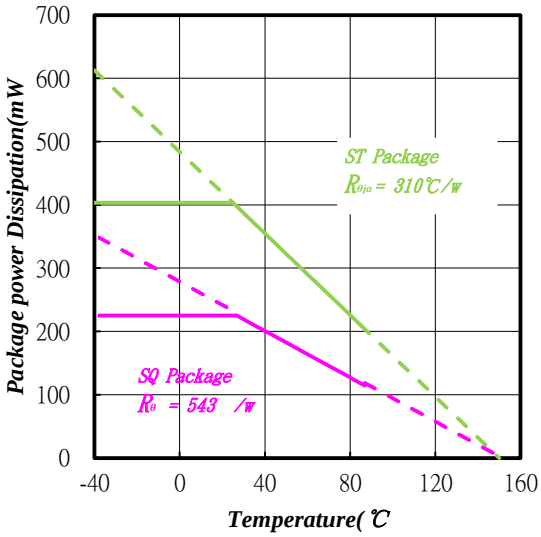
Typical Temperature(T_A) Versus Output Voltage(V_{DSON})



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



Power Dissipation versus Temperature(T)



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:

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

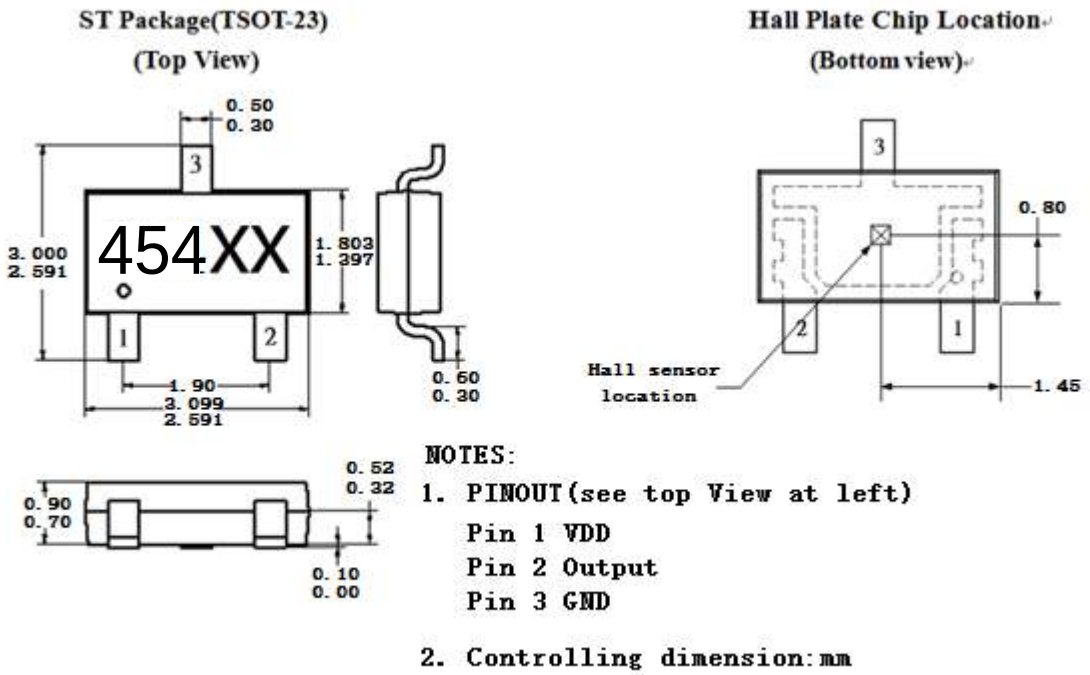
The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature Ta of 25℃, one can calculate the power dissipation of the device which in this case is 230 milliwatts.

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

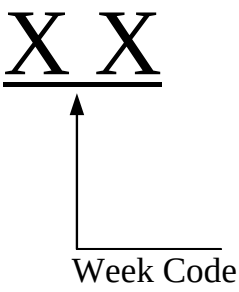
The 540℃/W for the SN package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 230 milliwatts. There are other alternatives to achieving higher power dissipation from the Package. Another alternative would be to use a ceramic substrate 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

HEX454 Package



ST Package Date Code



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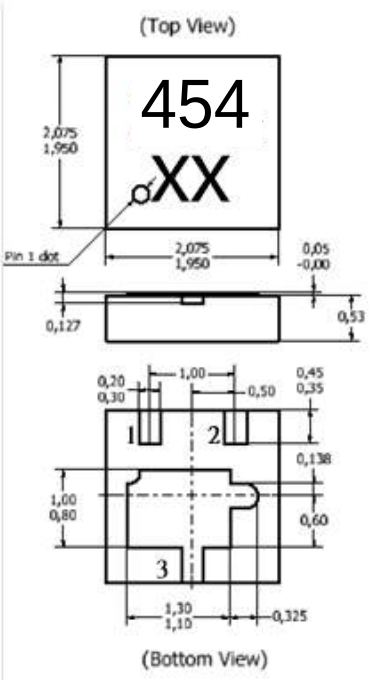
code	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM
week	14	15	16	17	18	19	20	21	22	23	24	25	26
code	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ
week	27	28	29	30	31	32	33	34	35	36	37	38	39
code	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM
week	40	41	42	43	44	45	46	47	48	49	50	51	52
code	TN	TO	TP	TQ	TR	TS	TT	TU	TV	TW	TX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

EX：2014 Year_8 Week → SH

HEX 454 ESQ Package

SQ Package

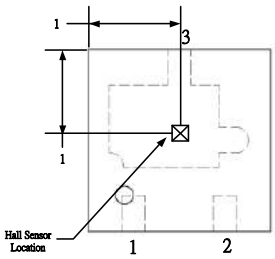


NOTES:

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.

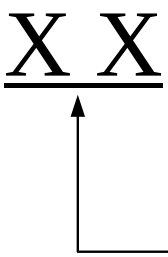
Hall Plate Chip Location

(Top view)



HEX 454 ESQ Package

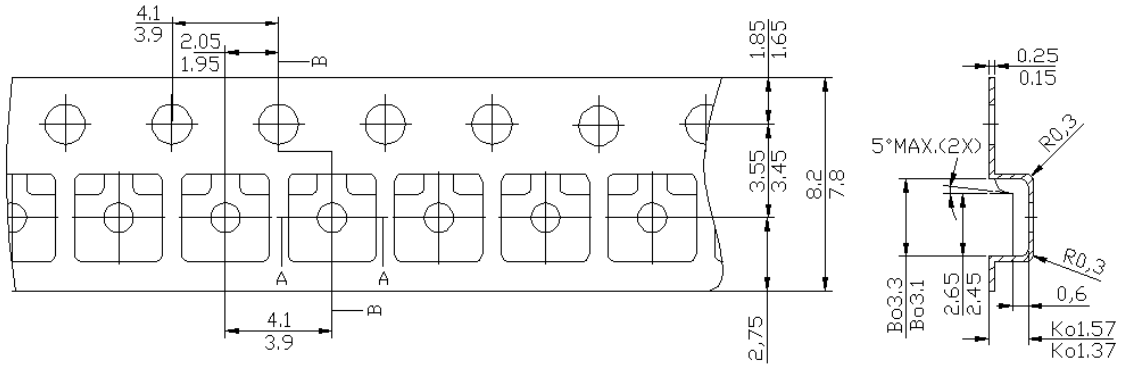
SQ Package Date Code

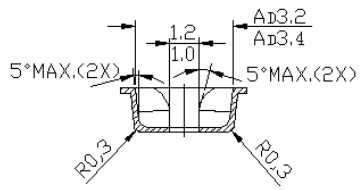


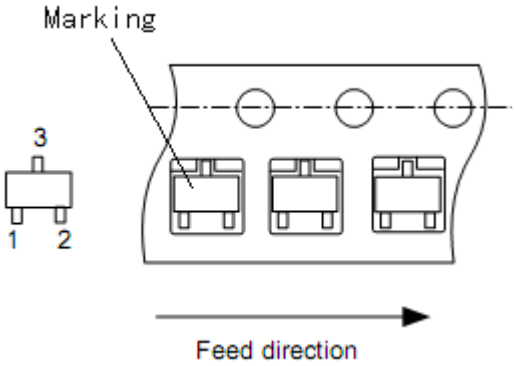
week	1	2	3	4	5	6	7	8	9	10	11	12	13
code	SA	SB	SC	SD	SE	SF	SG	SH	SI	SJ	SK	SL	SM
week	14	15	16	17	18	19	20	21	22	23	24	25	26
code	SN	SO	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY	SZ
week	27	28	29	30	31	32	33	34	35	36	37	38	39
code	TA	TB	TC	TD	TE	TF	TG	TH	TI	TJ	TK	TL	TM
week	40	41	42	43	44	45	46	47	48	49	50	51	52
code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

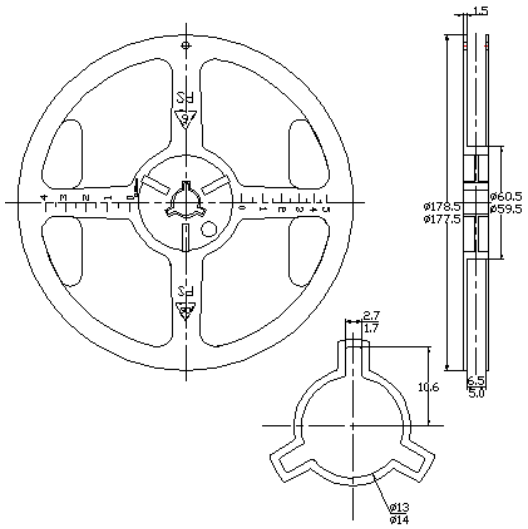
EX：2014 Year_8 Week → SH

TSOT- 23 package Tape On Reel Dimension





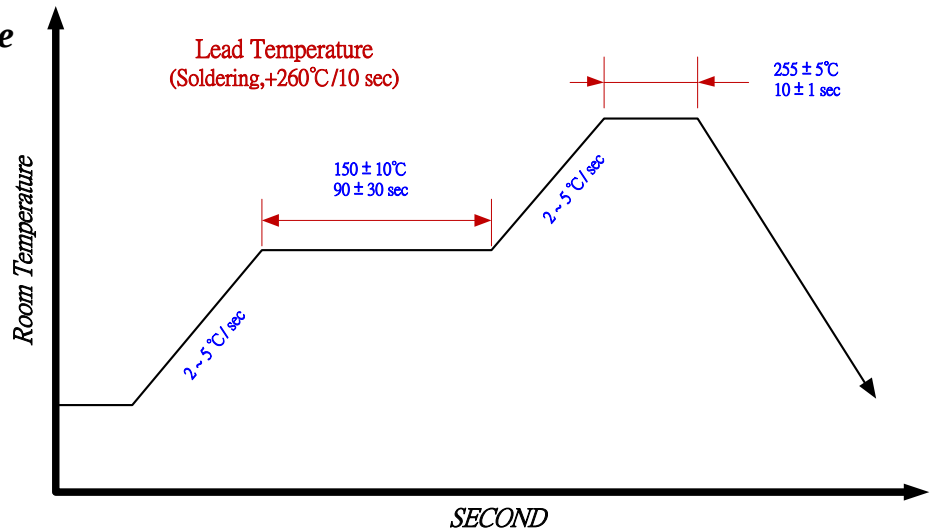




NOTES:

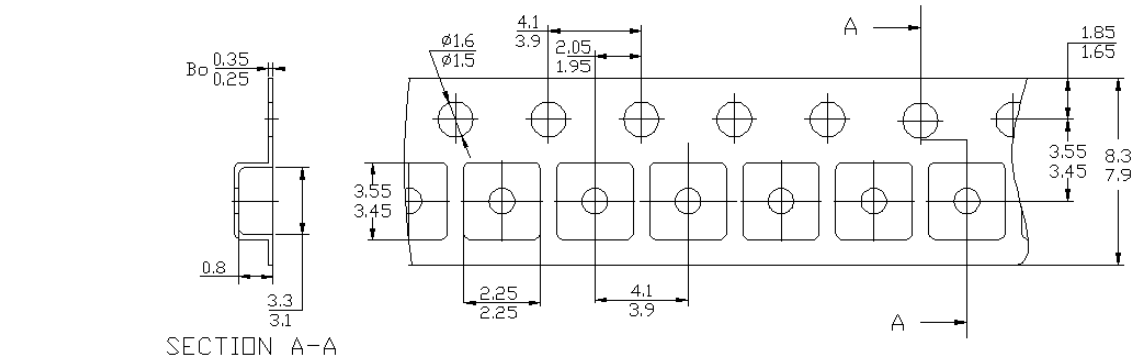
1. Material: Conductive polystyrene;
2. DIM in mm;
3. 10 sprocket hole pitch cumulative tolerance ±0.2;
4. Camber not to exceed 1mm in 100mm;
5. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole;
6. (S.R. OHM/SQ) Means surface electric resistivity of the carrier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

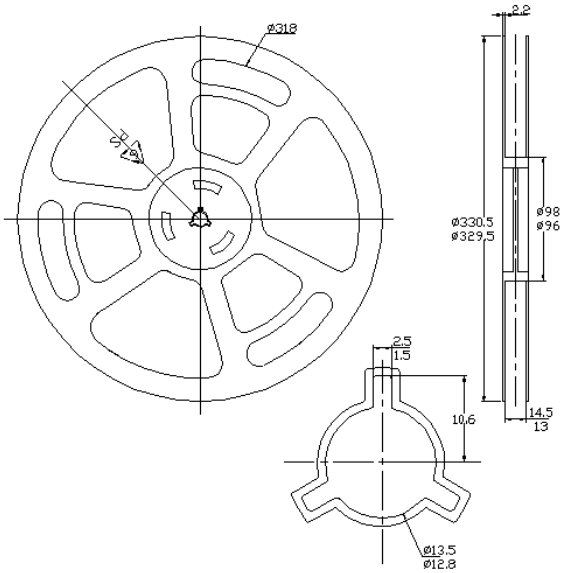
IR reflow curve



ST Soldering Condition

QFN2020-3 Tape On Reel Dimension





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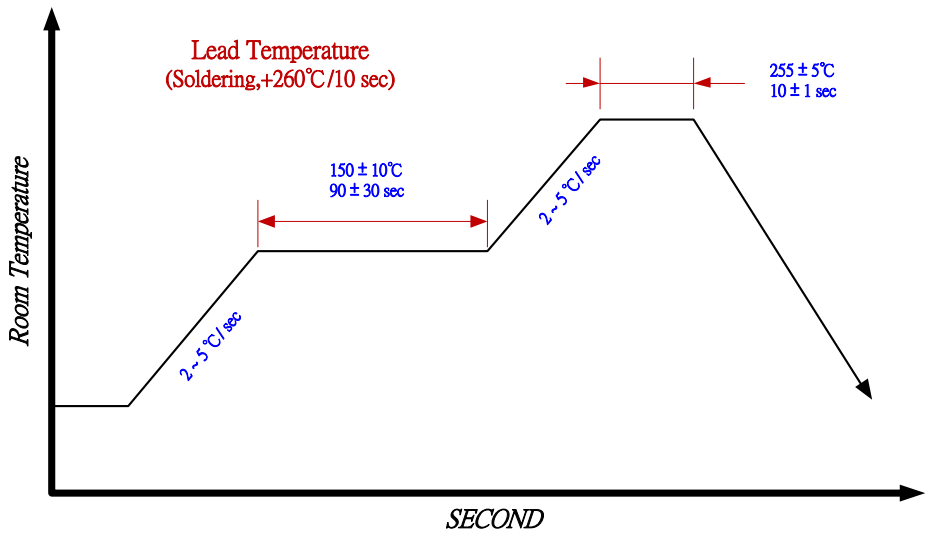

ST Soldering Condition

Packing specification:

Package	Reel	Box	Carton
TSOT-23(ST)	3,000pcs/reel	5 reel/box	4 box/carton
Weight	0.18kg	1.09kg	4.9kg
QFN2020-3	3,000pcs/reel	10 reel/box	2 box/carton
Weight	0.13kg	1.4kg	3.7kg