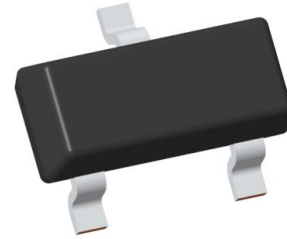


General Description



V_R	$R_{DS(on) MAX}$	$I_D Max.$	T_{jmax}
60V	4Ω@10V	115mA	150℃

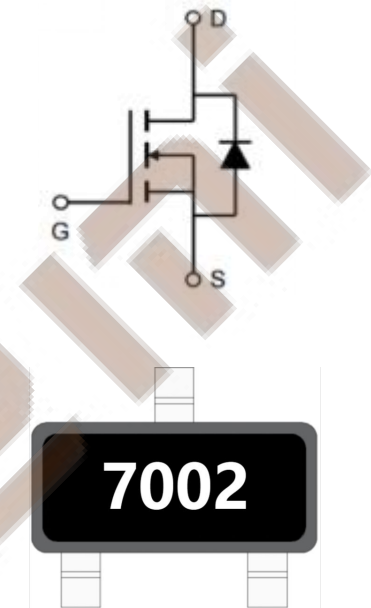


Features

- Energy Efficient
- Low Threshold Voltage
- High-speed Switching.
- DC/DC Converter.

Mechanical Data

- SOT-23 Small Outline Plastic Package.
- Epoxy UL: 94V-0.
- Mounting Position: Any.



Package Marking and Ordering Information

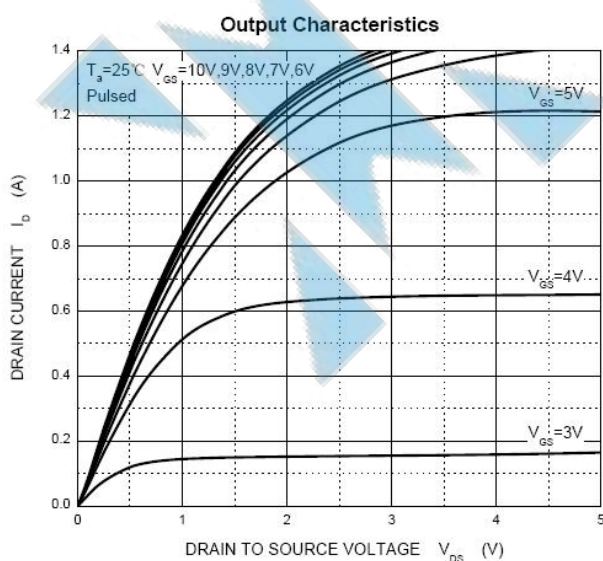
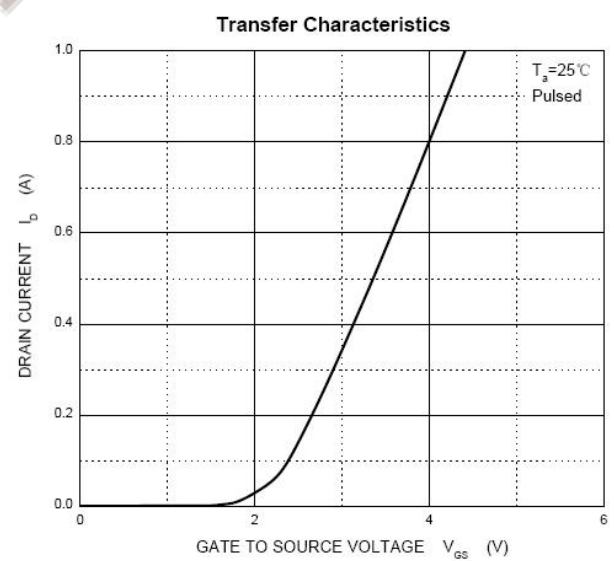
Product ID	Pack	Marking	Qty(PCS)
2N7002	SOT-23	7002	3000

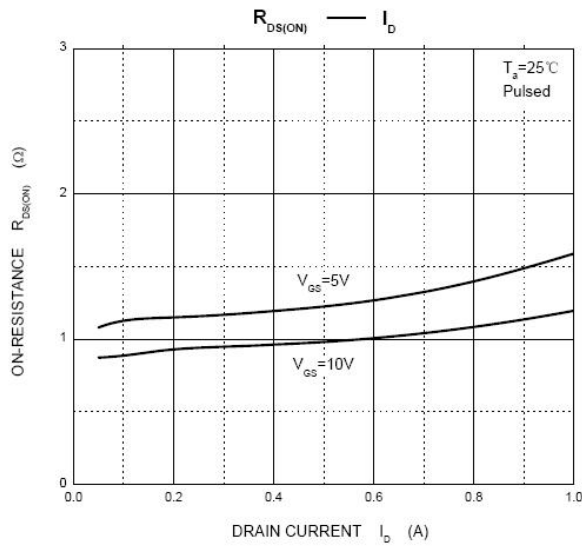
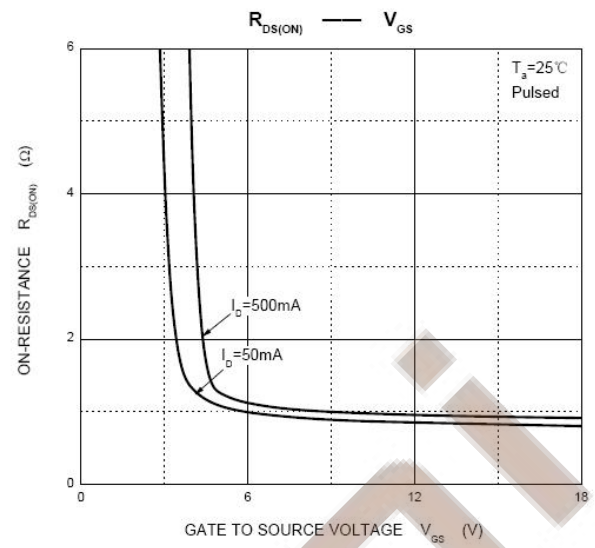
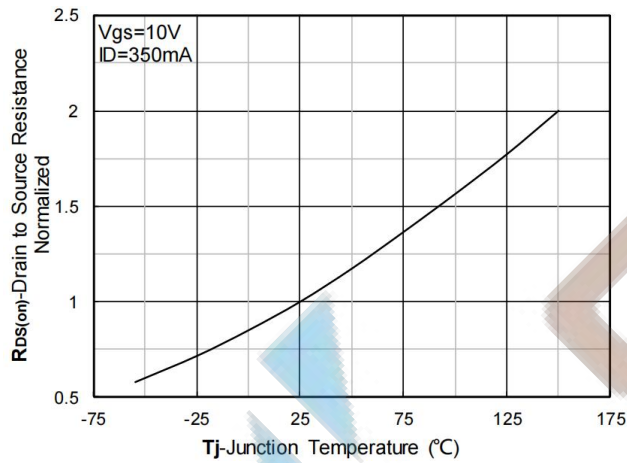
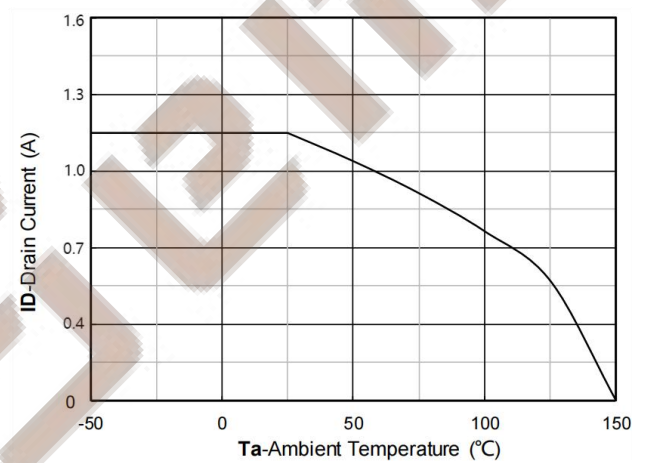
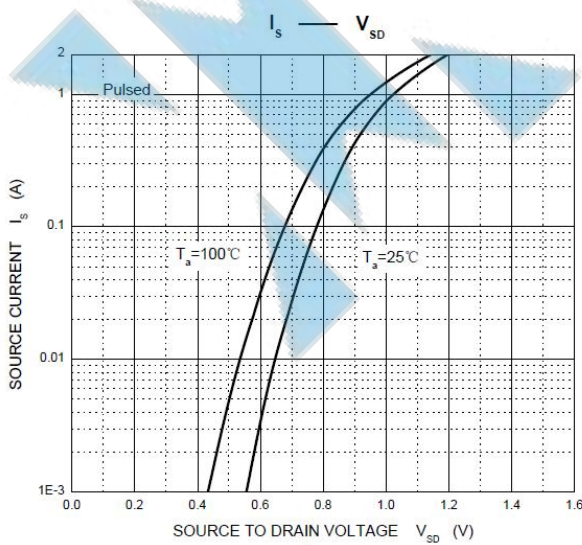
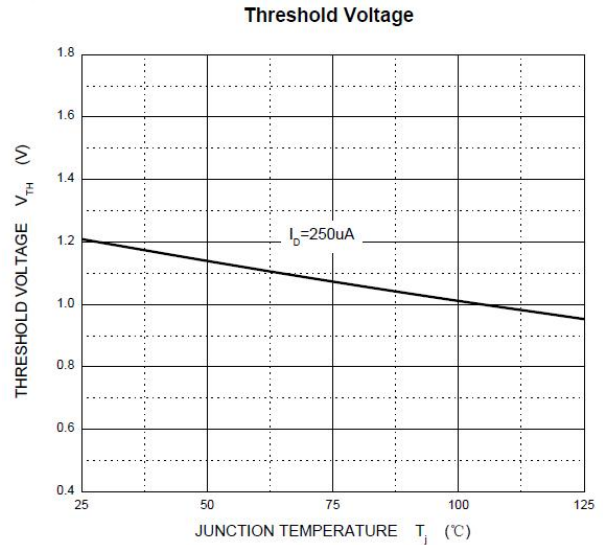
Absolute Maximum Ratings (Ta=25℃ unless otherwise noted)

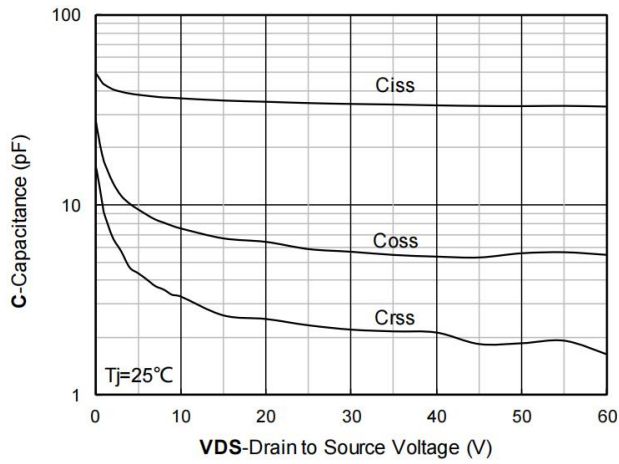
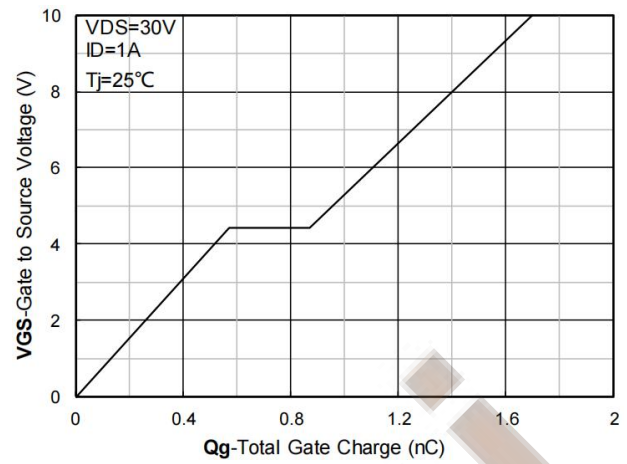
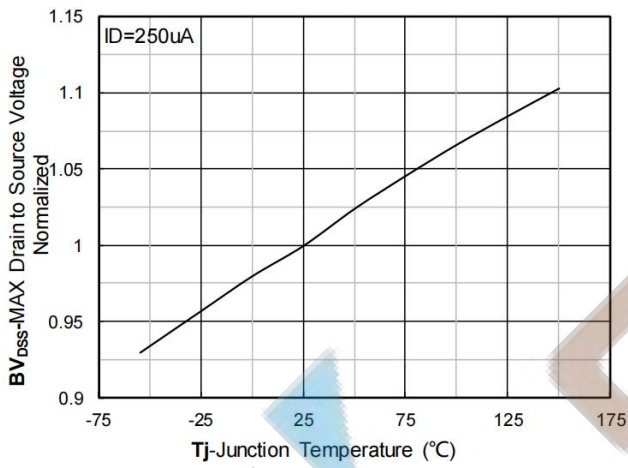
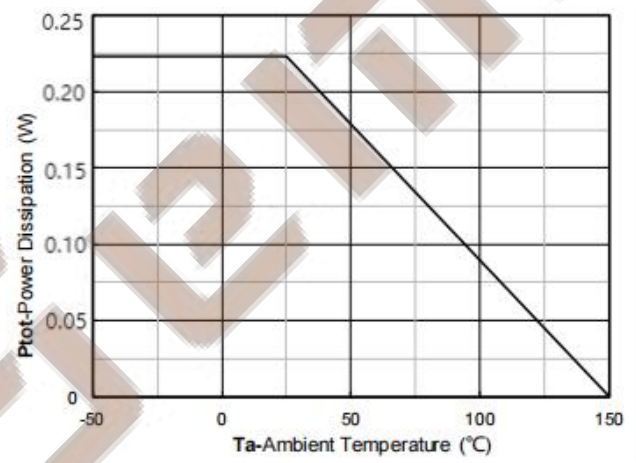
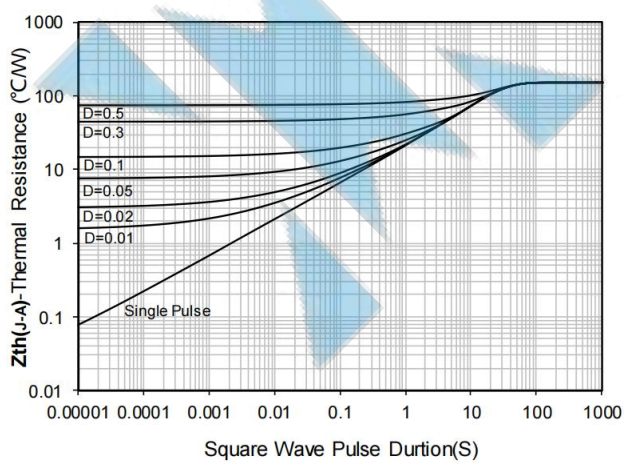
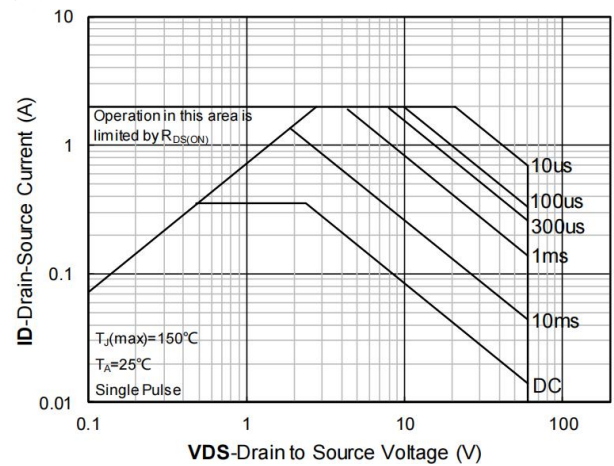
Parameter	Symbols	Rating	Units
Drain-Source Voltage	VDS	60	V
Gate-Source Voltage	VGS	±20	V
Continuous Drain Current	ID	115	mA
Power Dissipation	PD	225	mW
Junction Temperature	Tj	-50-+150	℃
Storage Temperature	Tstg	-50-+150	℃
Thermal Resistance From Junction to Ambient	R θ JA	556	℃/W

Electrical Characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V(BR)DSS	VGS=0V, ID=250uA	60			V
Gate-Threshold voltage	V _{GS} (th)	VDS= VGS, ID=1mA	1.0	1.3	2.5	V
Gate-body Leakage	IGSS	VDS=0V, VGS= ± 20V			± 80	nA
Zero Gate Voltage Drain current	IDSS	VDS=60V, VGS=0V			80	nA
Drain-Source On-Resistance	RDS(ON)	VGS=10V, ID=500mA		1.2	4	Ω
		VGS=5V, IC=50mA		1.3	4.5	
Diode Forward Voltage	VSD	Is=115mA, VGS=0V	0.55		1.2	V
Continuous Diode Forward Current	IS				115	mA
Gate-Source Charge	Qgs	VGS=10V, VDS=30V, ID=300mA		1.6		nC
Output Capacitance	Qgd			0.47		
Reverse Transfer Capacitance	Qg			0.25		
Input capacitance	Ciss	VDS=30V, VGS=0V, f=1MHz		27.5		pF
Output capacitance	Coss			2.75		
Reverse Transfer capacitance	Crss			1.9		
Turn-on Delay Time	td(on)	VGS=10V, VDD=30V, ID=300mA RGEN=5 Ω		3.3		ns
Rise Time	tr			19		
Turn-off Delay Time	td(off)			9.6		ns
Fall Time	tf			49		ns

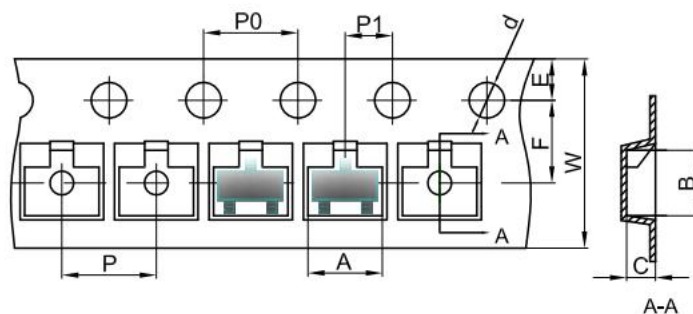
Typical Characteristics






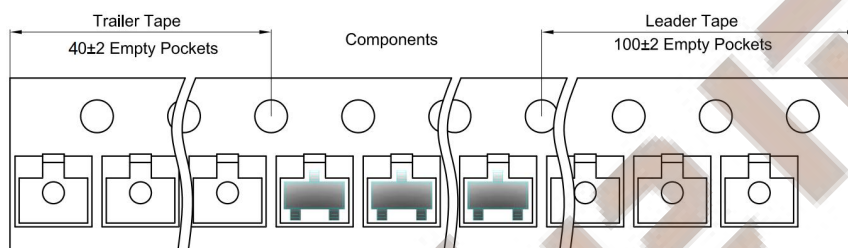
Package Information

Carrier Dimension(mm)

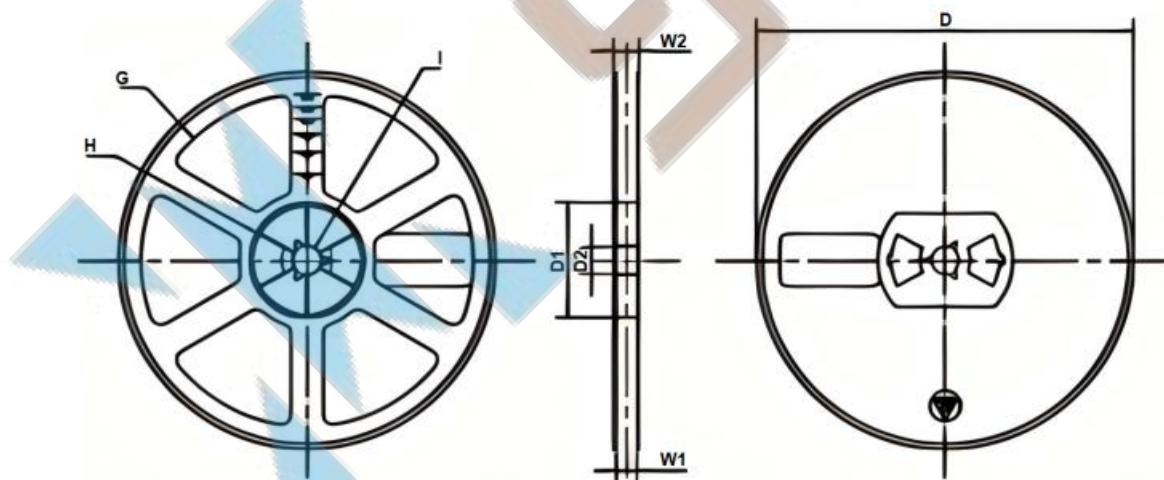


Dimensions are in millimeter

Pkg Type	A0	A1	B0	B1	K0	D0	D1	E	F	P0	P1	P2	10*P0	W	T
SOT-23	3.15	1.09	2.77	2.15	1.22	1.55	1.00	1.75	3.50	4.00	4.00	2.00	40.00	8.00	0.20
(Tolerance)	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.2	±0.1	±0.03



Reel Dimension(mm)



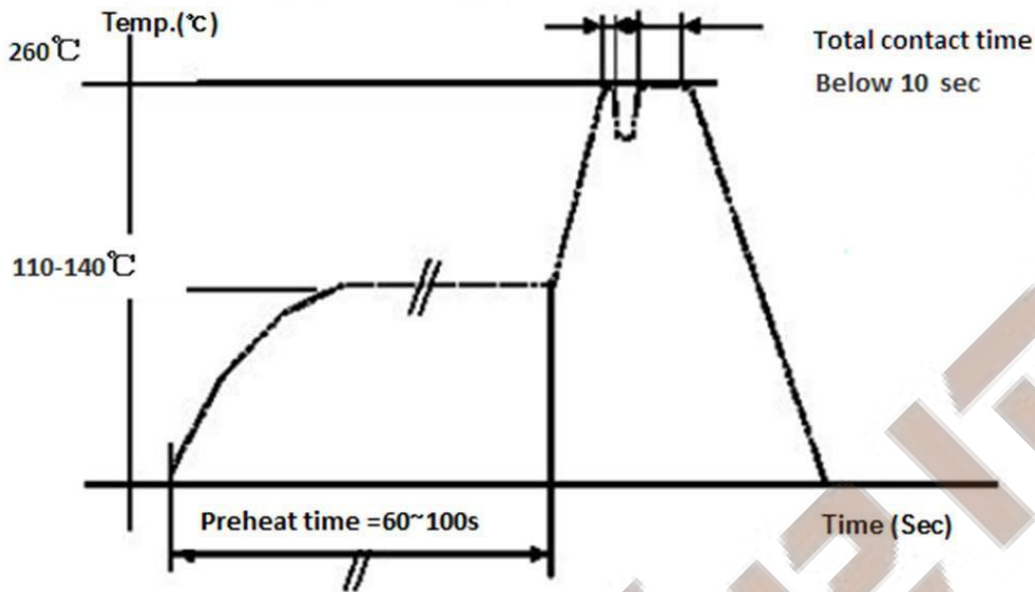
Reel Option	D	D1	D2	G	H	I	W1	W2
7"Dia	Φ178.00	54.40	13.00	R78.00	R25.60	R6.50	9.50	12.30
Tolerance	±2	±1	±1	±1	±1	±1	±1	±1

Package Specifications

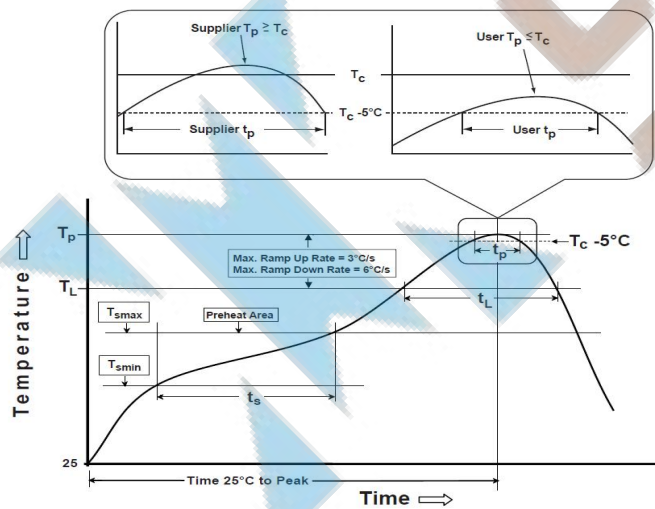
Package	Reel Size	Reel DIA. (mm)	Q'TY/Reel (Kpcs)	Box Size (mm)	QTY/Box (Kpcs)	Carton Size (mm)	Q'TY/Carton (Kpcs)
SOT23	7'	178	3	210*208*203	45	440*400*230	180

Recommended Soldering Profile for Rectifier Diodes (Pb Free)

a) Wave Soldering Profile



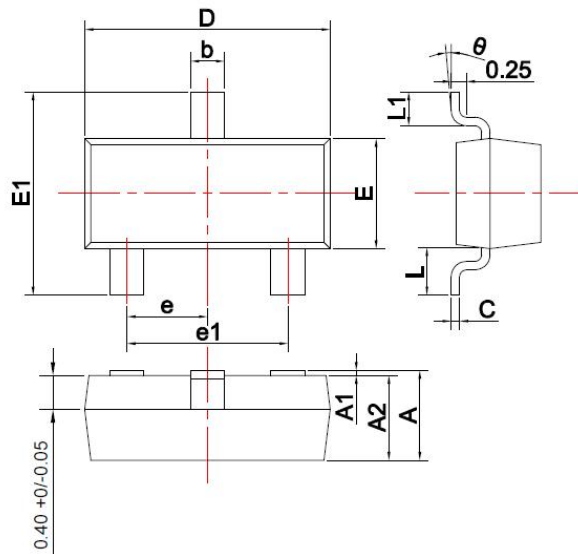
b) Reflow Soldering Profile (Pb Free Application), refer to IPC/JEDEC J-STD-020



Preheat/Soak Temperature Min (T _{smin}) Temperature Max (T _{smax}) Time (t _s) from (T _{smin} to T _{smax})	50 °C 200 °C 60-120 seconds
Melting Point of Solder (Sn Ag Cu)	217°C
Ramp-up Rate to 217°C(Melting Point of Solder)	3°C/sec
Time at Temp.>217°C (Melting Point of Solder)	60~150 Sec
Peak Temperature	255±5°C
Time within 5°Cbelow Peak Temp.	20~40 Sec
Cooling Rate	6°C/sec (max)
Time from 25°C to Peak Temp.	8min (max)

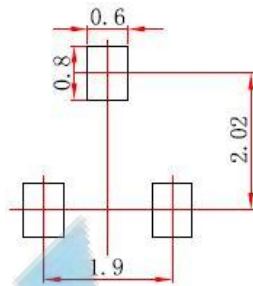
c) Manual Soldering

When using an electric soldering iron for manual soldering, it is recommended that the temperature does not exceed 300°C and the soldering time is less than 10 seconds.

Package Mechanical Data


SYMBOL	DIMENSIONS	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

Unit: mm

Suggested Pad Layout

Note:

1. Controlling dimension: In millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

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