20V P-Channel Enhancement Mode MOSFET

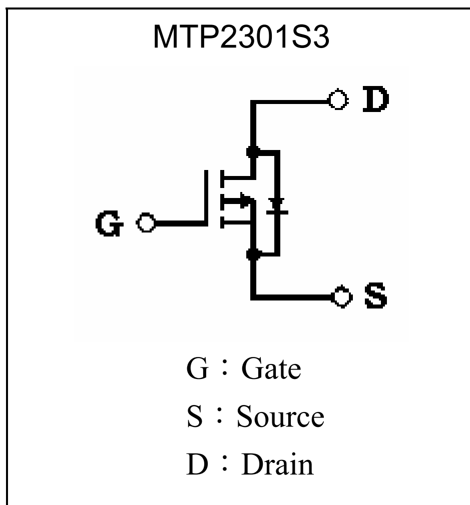
MTP2301S3

BV_{DSS}	-20V
I_D	-1.6A
$R_{DSON(MAX)}$@V_{GS}=-4.5V, I_D=-1.6A	75mΩ(typ.)
$R_{DSON(MAX)}$@V_{GS}=-2.5V, I_D=-1A	113mΩ(typ.)

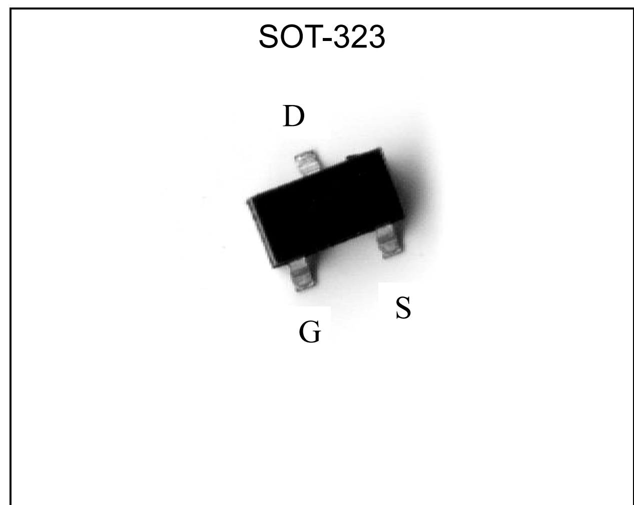
Features

- Advanced trench process technology
- High density cell design for ultra low on resistance
- Excellent thermal and electrical capabilities
- Compact and low profile SOT-323 package
- Pb-free lead plating and halogen-free package

Equivalent Circuit



Outline



Ordering Information

Device	Package	Shipping
MTP2301S3-0-T1-G	SOT-323 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	-20	V
Gate-Source Voltage		V_{GS}	±8	V
Continuous Drain Current @T_A=25°C, V_{GS}=-4.5V		I_D	-1.6	A
Continuous Drain Current @T_A=70°C, V_{GS}=-4.5V			-1.3	
Pulsed Drain Current		I_{DM}	-10	
Maximum Power Dissipation	Ta=25℃	P_D	340 (Note)	mW
	Ta=70℃		218 (Note)	
Operating Junction and Storage Temperature Range		Tj ; Tstg	-55~+150	°C

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient(PCB mounted)	Rth,ja	367 (Note)	°C/W

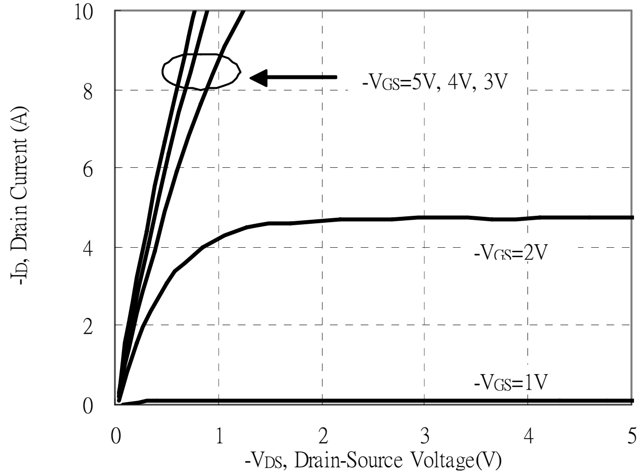
Note : Device mounted on minimum copper pad.

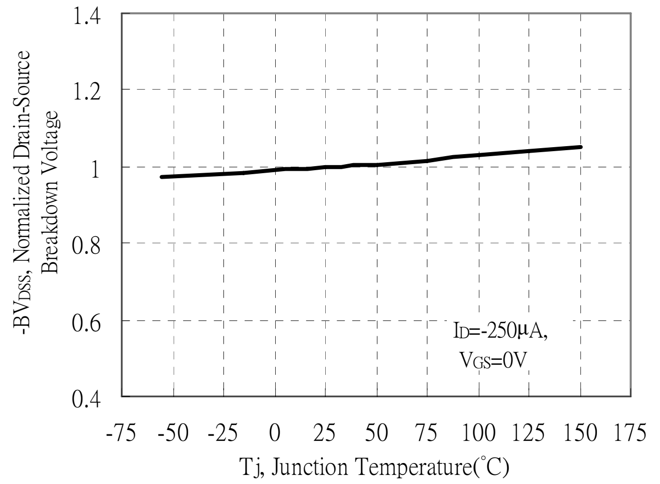
Electrical Characteristics (Ta=25°C)

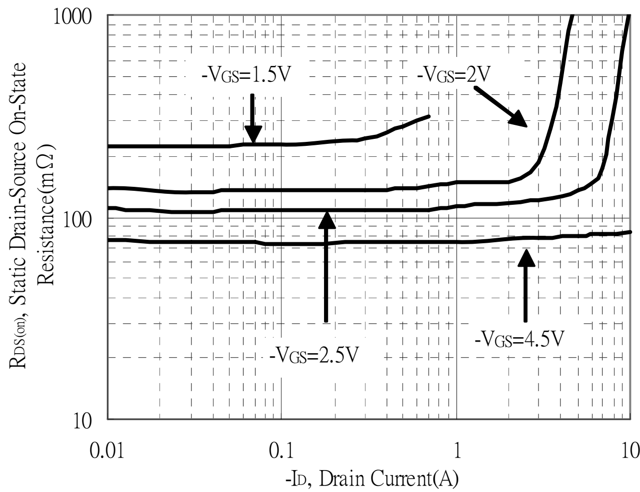
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-20	-	-	V	V_{GS}=0, I_D=-250μA
$V_{GS(th)}$	-0.45	-	-	V	V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±8V, V_{DS}=0
I_{DSS}	-	-	-1	μA	V_{DS}=-16V, V_{GS}=0
*$R_{DS(ON)}$	-	75	110	mΩ	I_D=-1.6A, V_{GS}=-4.5V
	-	113	150		I_D=-1A, V_{GS}=-2.5V
*G_{FS}	-	4.5	-	S	V_{DS}=-5V, I_D=-1.6A
Dynamic					
Ciss	-	446	-	pF	V_{DS}=-10V, V_{GS}=0, f=1MHz
Coss	-	57	-		
Crss	-	52	-		
$t_{d(ON)}$	-	9.2	20	ns	V_{DD}=-10V, I_D=-1A, V_{GS}=-4.5V, R_G=6Ω
t_r	-	7.3	60		
$t_{d(OFF)}$	-	38	50		
t_f	-	12	20		
Qg	-	4.4	-	nC	V_{DS}=-10V, I_D=-1.6A, V_{GS}=-2.5V
Qgs	-	0.5	-		
Qgd	-	1.5	-		
Source-Drain Diode					
I_S	-	-	-1.6	A	-
V_{SD}	-	-0.86	-1.2	V	V_{GS}=0V, I_S=-1.6A
trr*	-	30	-	ns	I_F=-3A, dI_F/dt=100A/μs
Qrr*	-	25	-	nC	

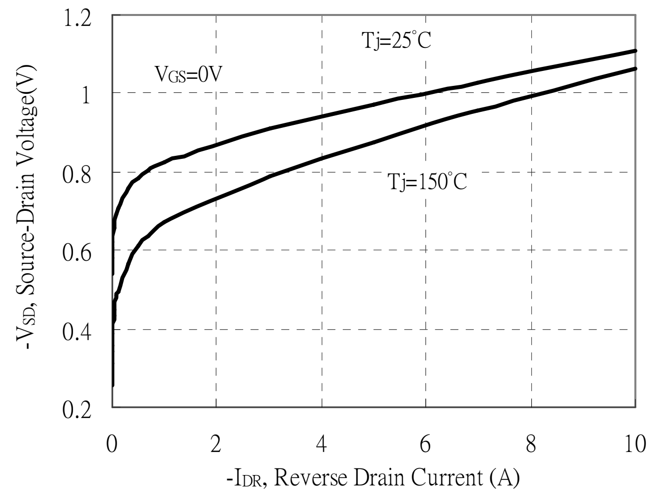
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

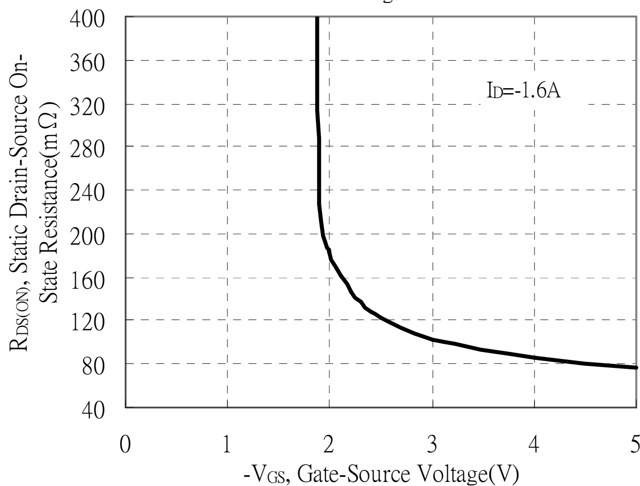
Typical Characteristics

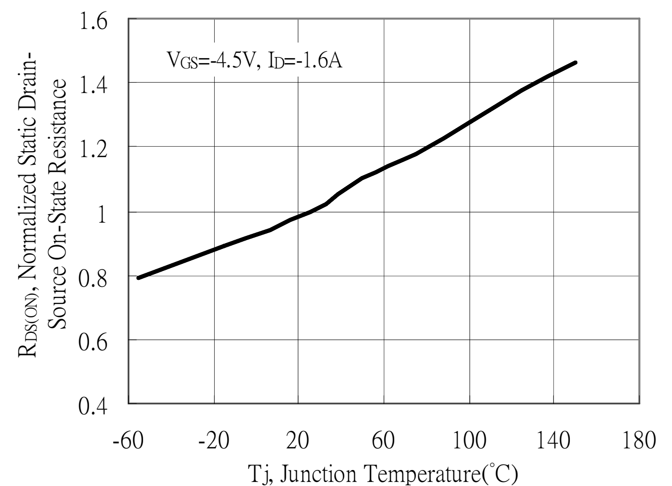




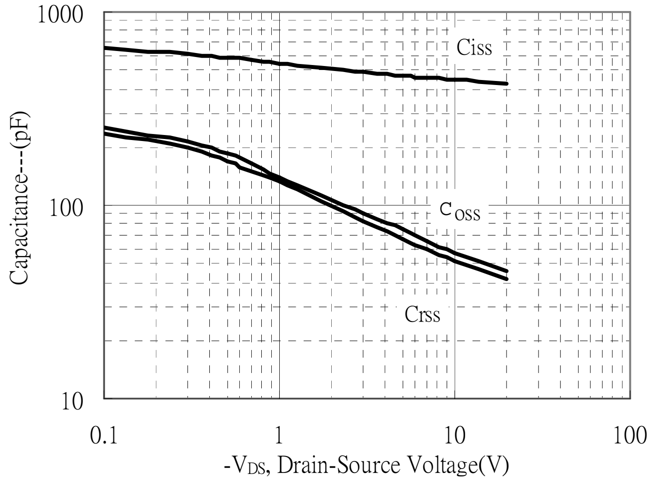


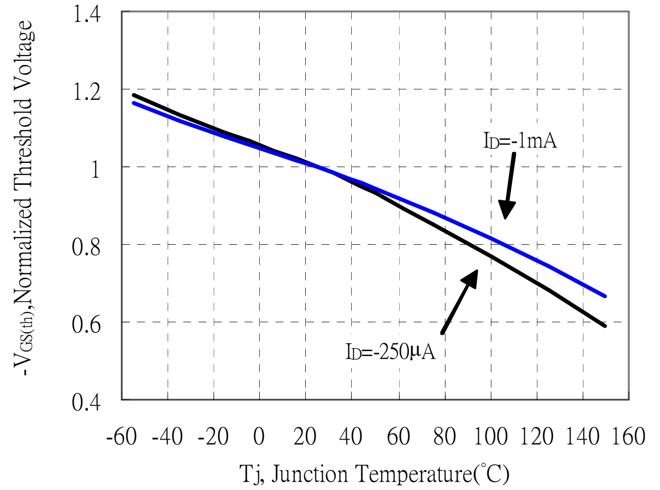


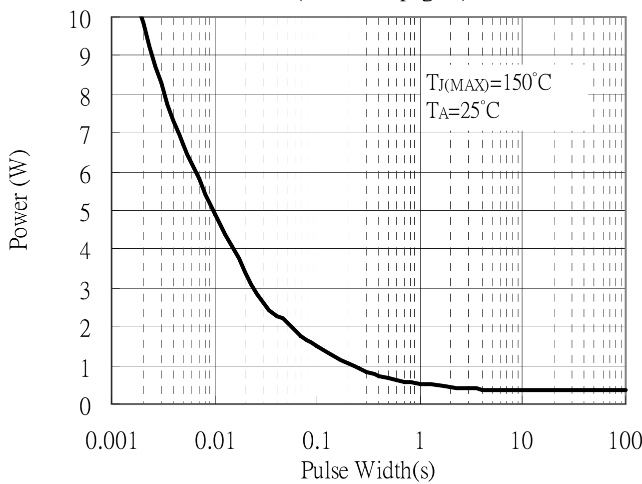


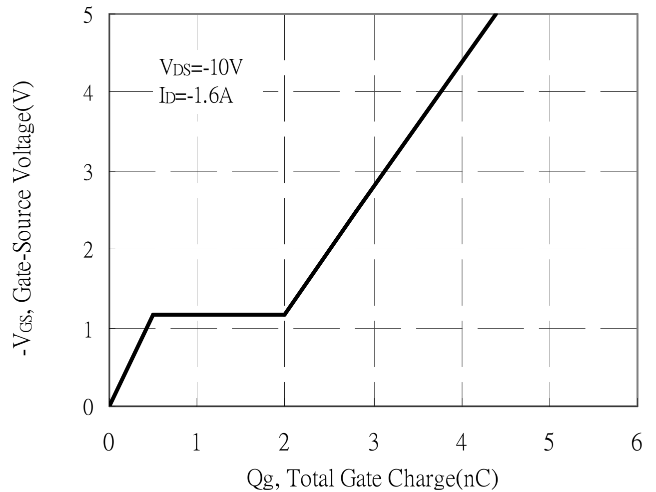


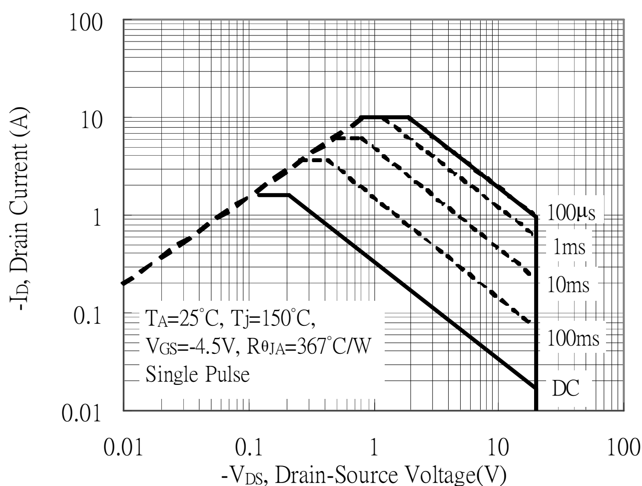
Typical Characteristics(Cont.)

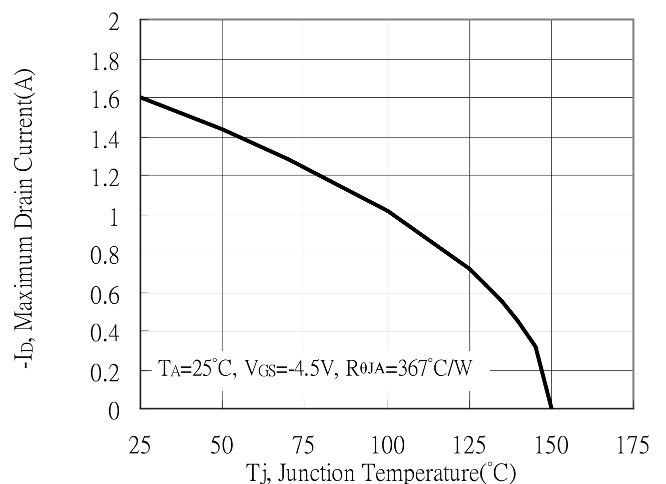




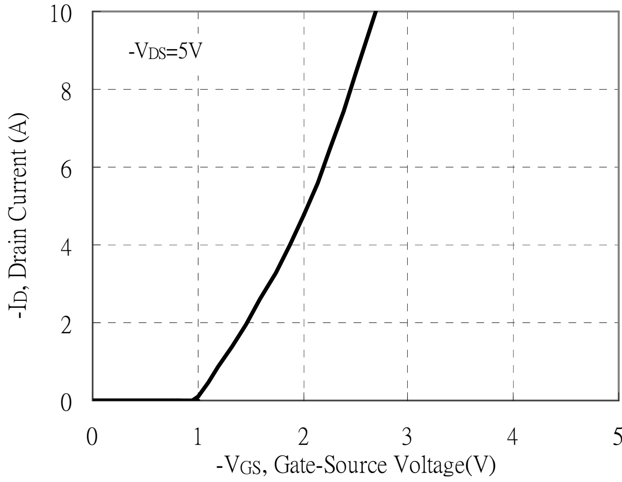


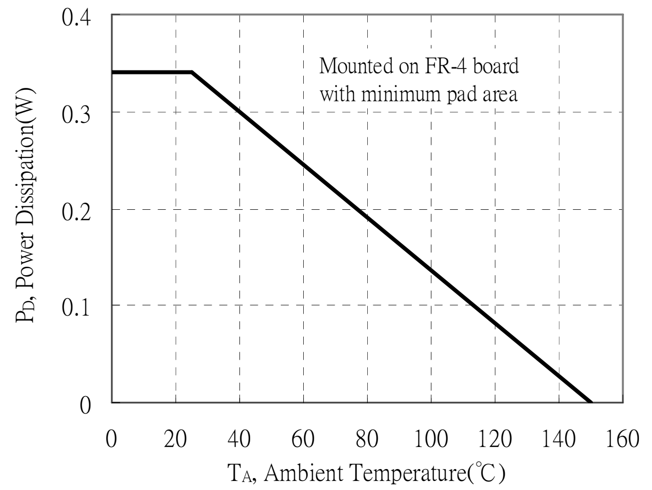


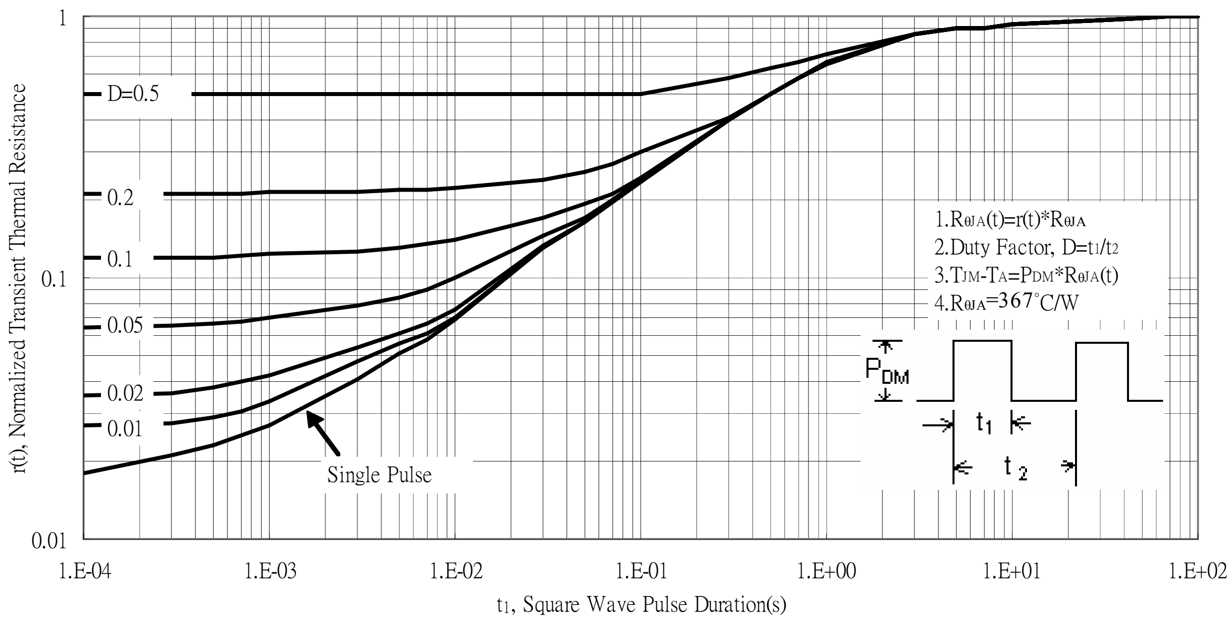




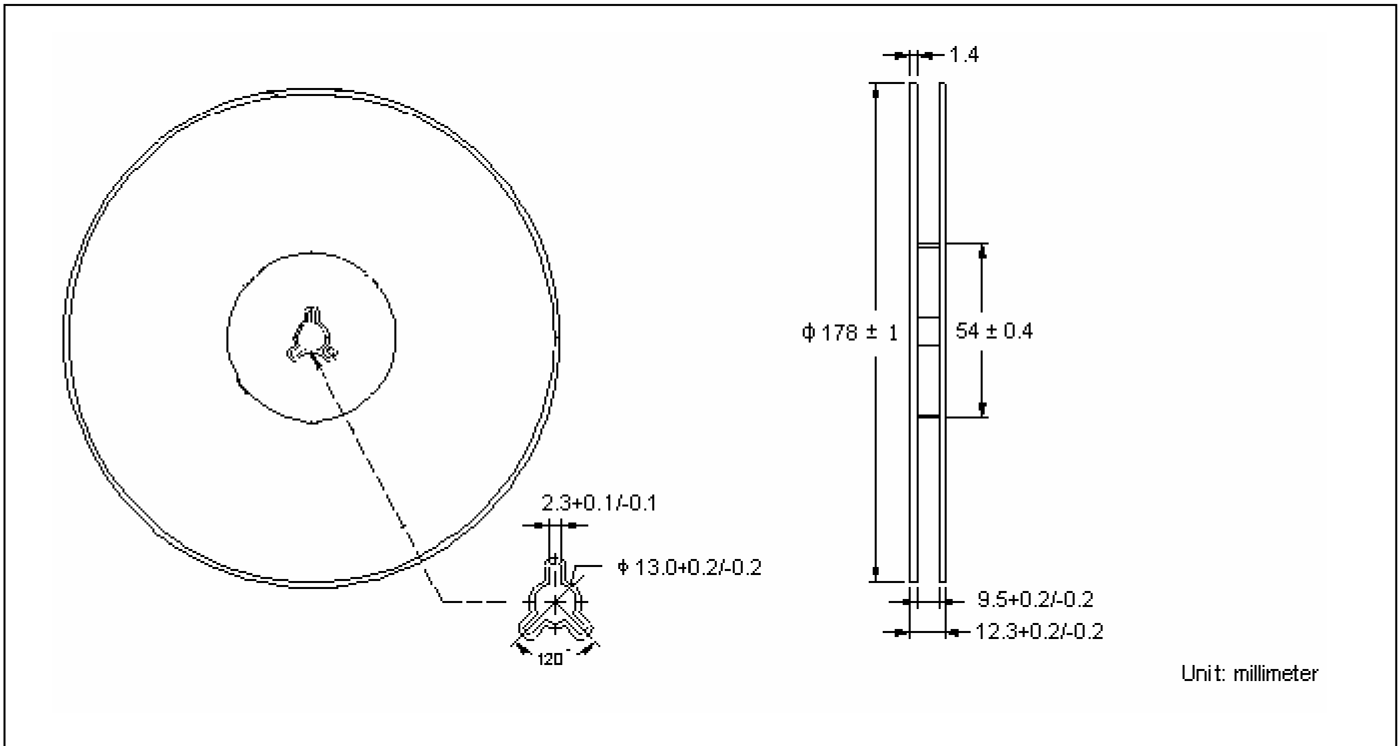
Typical Characteristics(Cont.)



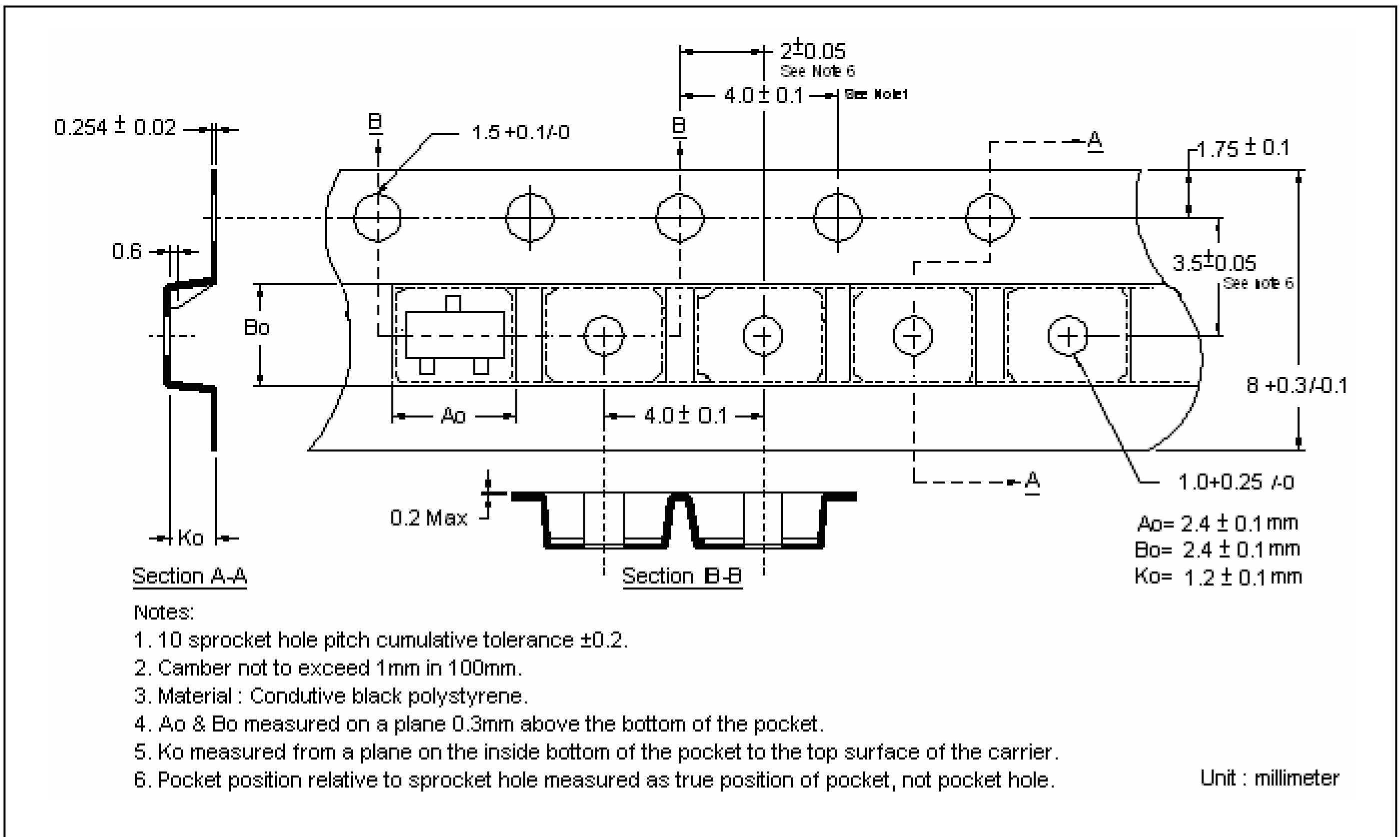




Reel Dimension



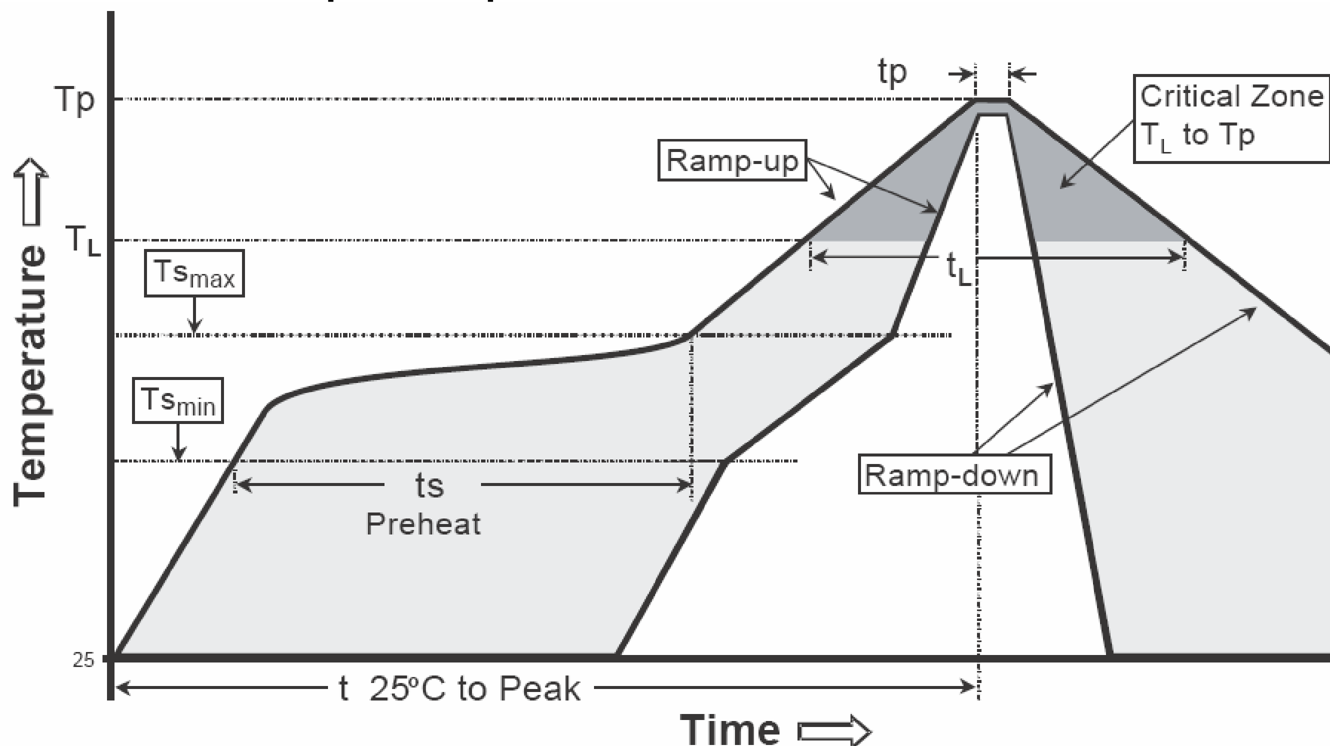
Carrier Tape Dimension



Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

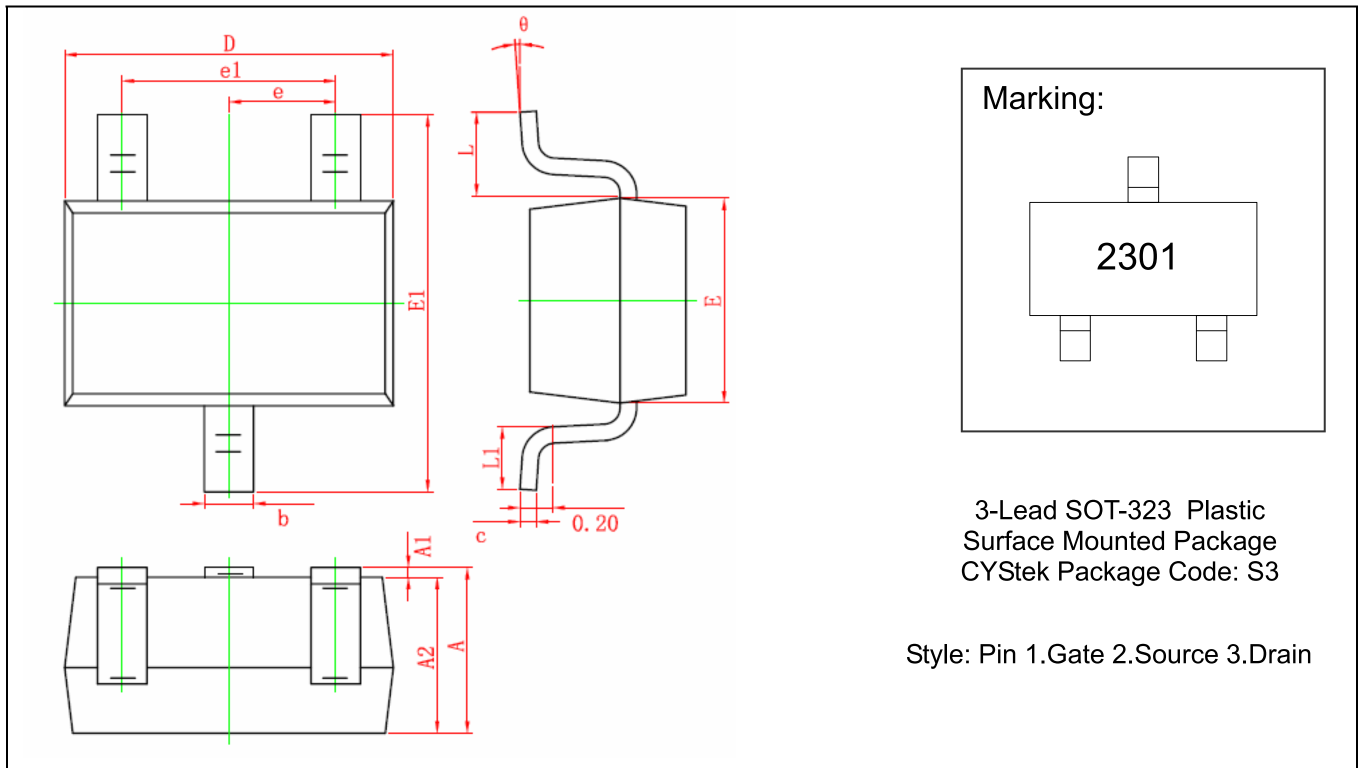
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time(ts_{min} to ts_{max})	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(T_P)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

SOT-323 Dimension



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043	E1	2.150	2.450	0.085	0.096
A1	0.000	0.100	0.000	0.004	e	0.650	TYP	0.026	TYP
A2	0.900	1.000	0.035	0.039	e1	1.200	1.400	0.047	0.055
b	0.200	0.400	0.008	0.016	L	0.525	REF	0.021	REF
c	0.080	0.150	0.003	0.006	L1	0.260	0.460	0.010	0.018
D	2.000	2.200	0.079	0.087	θ	0°	8°	0°	8°
E	1.150	1.350	0.045	0.053					

Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

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