20V P-Channel Enhancement Mode MOSFET

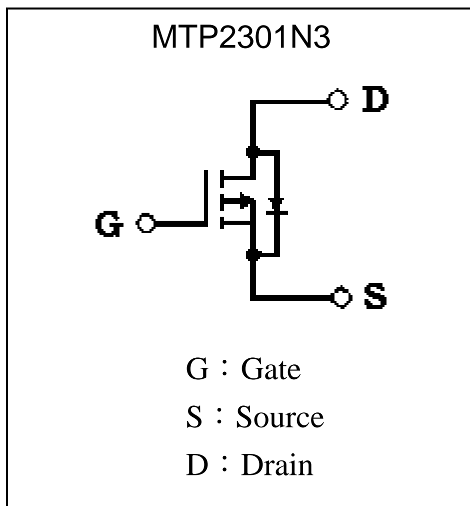
MTP2301N3

BV_{DSS}	-20V
I_D@T_A=25°C, V_{GS}=-4.5V	-3.4A
$R_{DSON(TYP)}$@V_{GS}=-4.5V, I_D=-2.8A	79mΩ
$R_{DSON(TYP)}$@V_{GS}=-2.5V, I_D=-2A	116mΩ

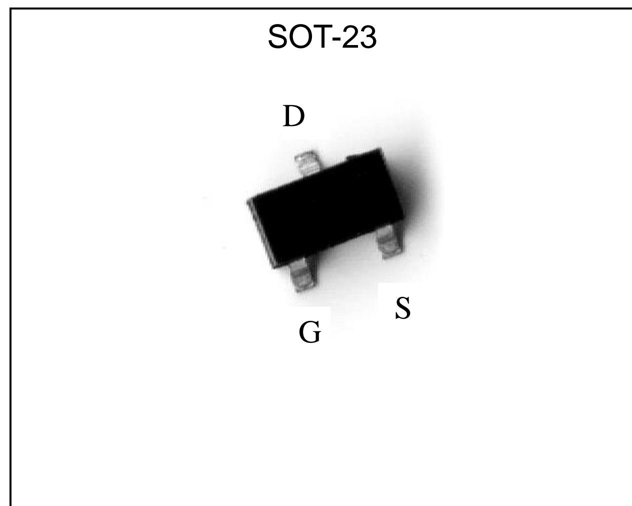
Features

- Advanced trench process technology
- High density cell design for ultra low on resistance
- Excellent thermal and electrical capabilities
- Compact and low profile SOT-23 package
- Pb-free lead plating and halogen-free package

Equivalent Circuit

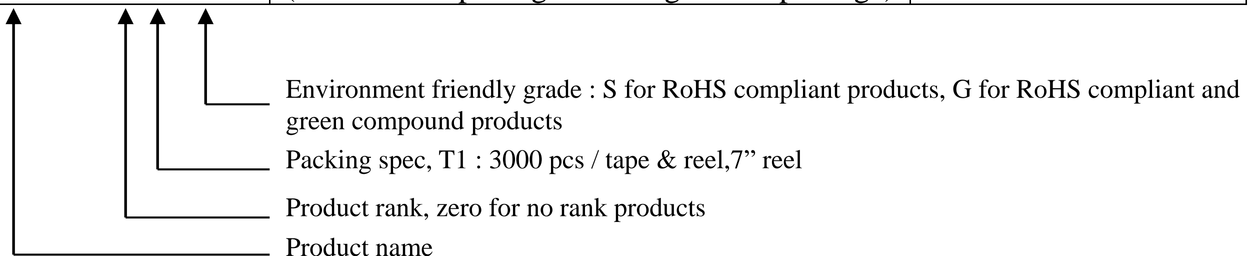


Outline



Ordering Information

Device	Package	Shipping
MTP2301N3-0-T1-G	SOT-23 (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	-3.4	A
Continuous Drain Current @T_A=70°C, V_{GS}=-4.5V			-2.7	
Pulsed Drain Current		I_{DM}	-10	
Maximum Power Dissipation	Ta=25℃	P_D	1.38 (Note)	W
	Ta=70℃		0.88 (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	90 (Note)	°C/W
Lead Temperature, for 5 second soldering(1/8” from case)	T_L	260	°C

Note : Surface mounted on 1 in ^{2} FR-4 board with 2 oz. copper, t≦5sec; 270°C/W when mounted on minimum copper pad.

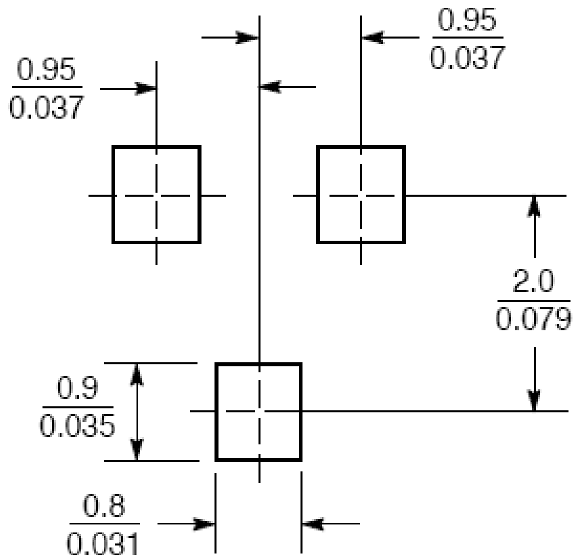
Electrical Characteristics (Ta=25°C)

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
*$R_{DS(ON)}$	-	79	100	mΩ	I_D=-2.8A, V_{GS}=-4.5V
	-	116	150		I_D=-2A, V_{GS}=-2.5V
*G_{FS}	-	6.3	-	S	V_{DS}=-5V, I_D=-2.8A
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, R_L=6Ω, V_{GEN}=-4.5V, R_G=6Ω
t_r	-	7.3	60		
$t_{d(OFF)}$	-	38	50		
t_f	-	12	20		
Qg(V_{GS}=-2.5V)	-	3	10	nC	V_{DS}=-10V, I_D=-3A, V_{GS}=-4.5V
Qg(V_{GS}=-4.5V)	-	6.2	15		
Qgs	-	0.8	-		
Qgd	-	1.1	-		

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	

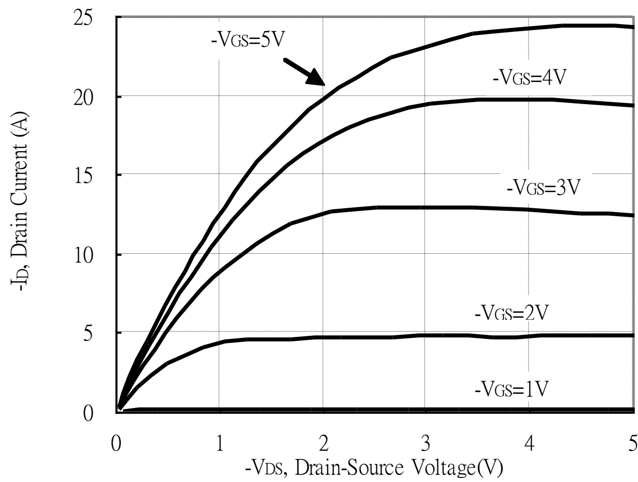
*Pulse Test : Pulse Width ≤300µs, Duty Cycle≤2%

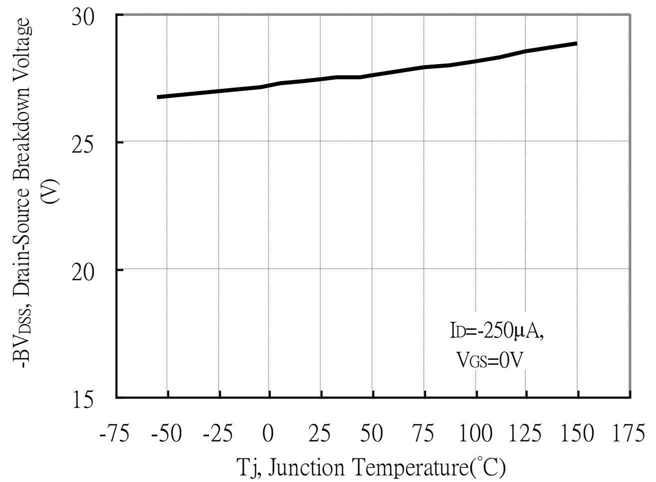
Recommended Soldering Footprint

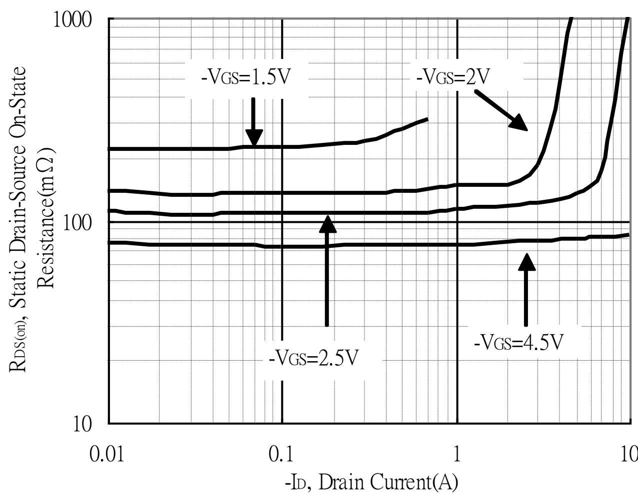


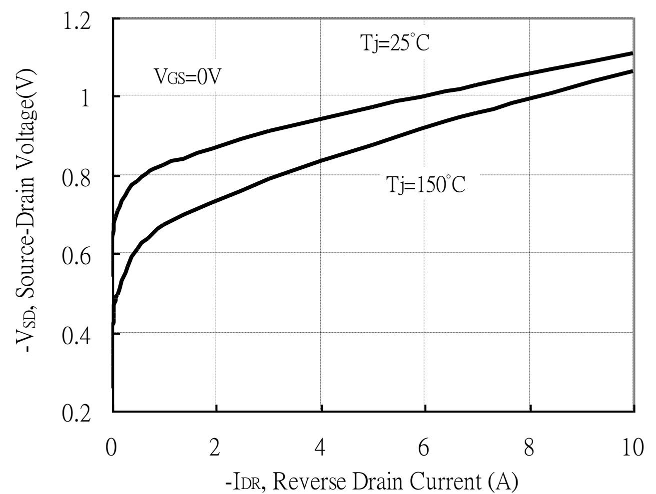
Unit : mm / inches

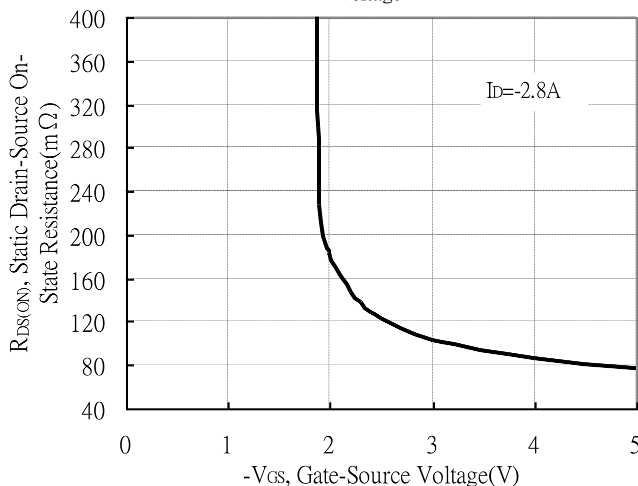
Typical Characteristics

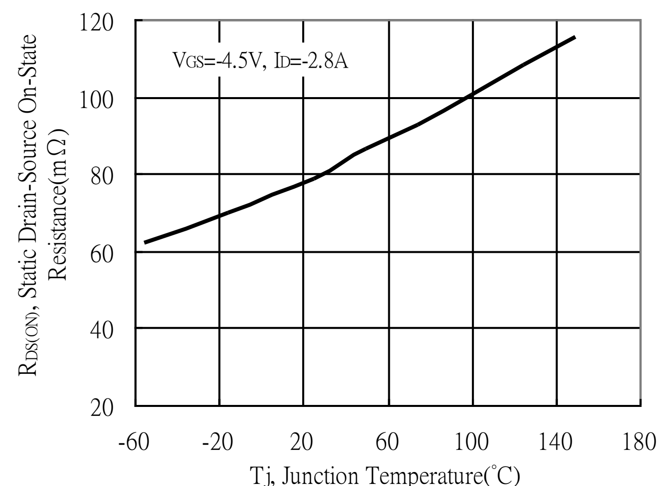




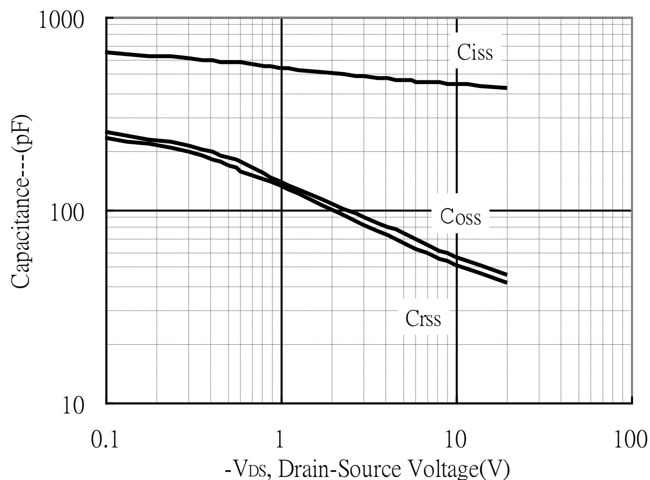


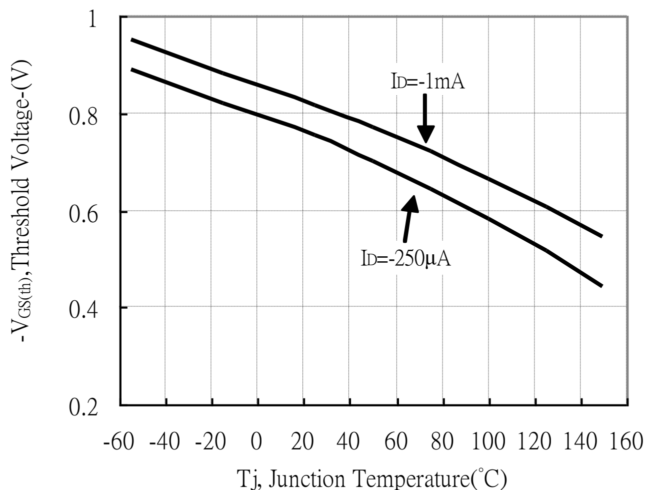


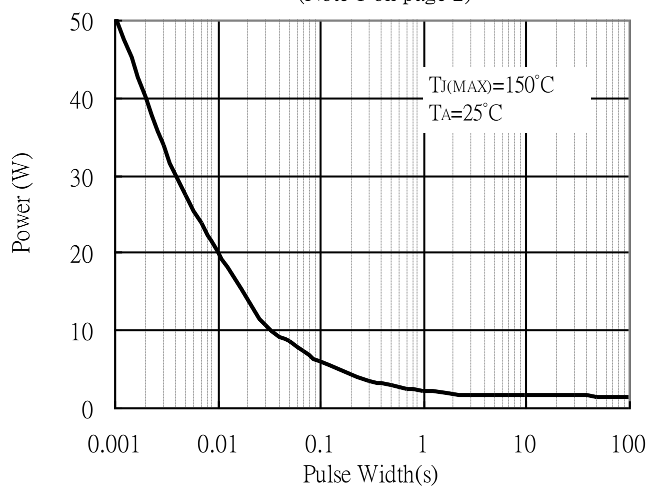


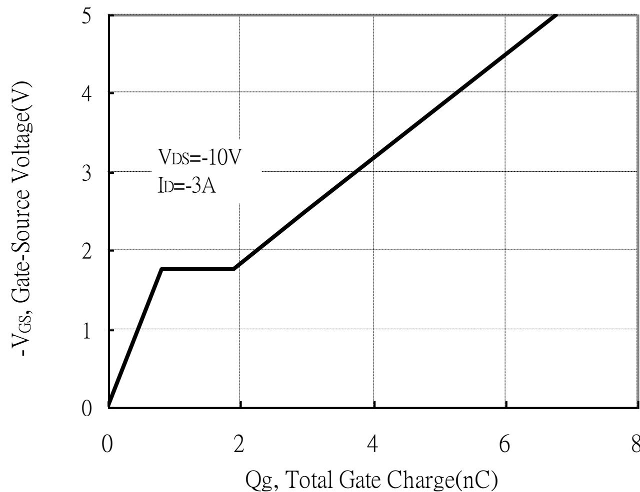


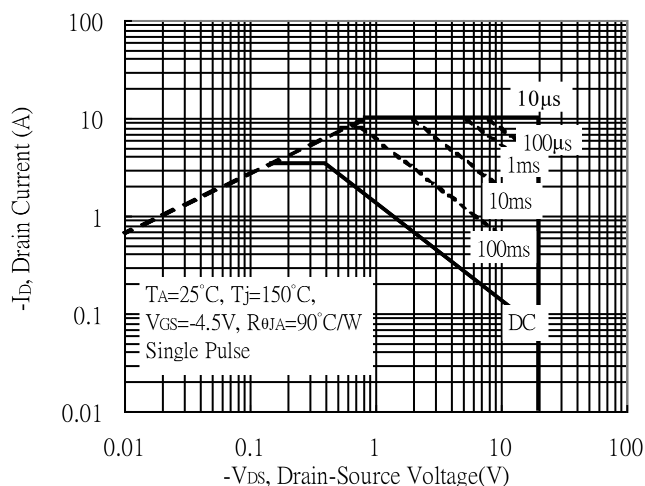
Typical Characteristics(Cont.)

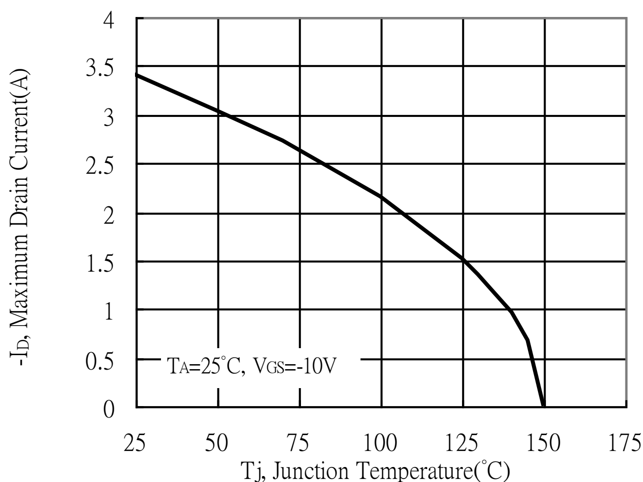




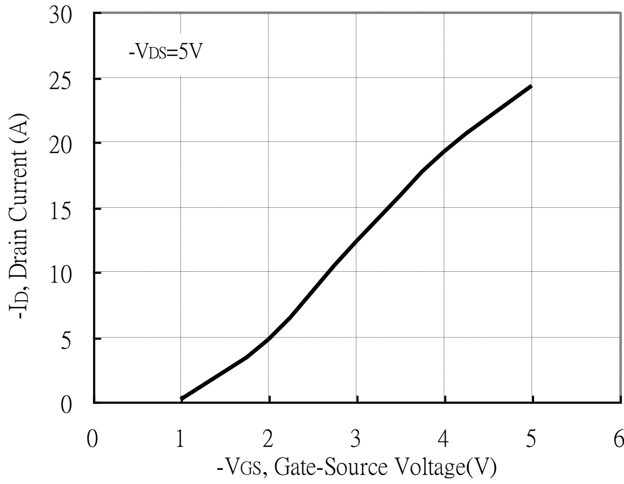


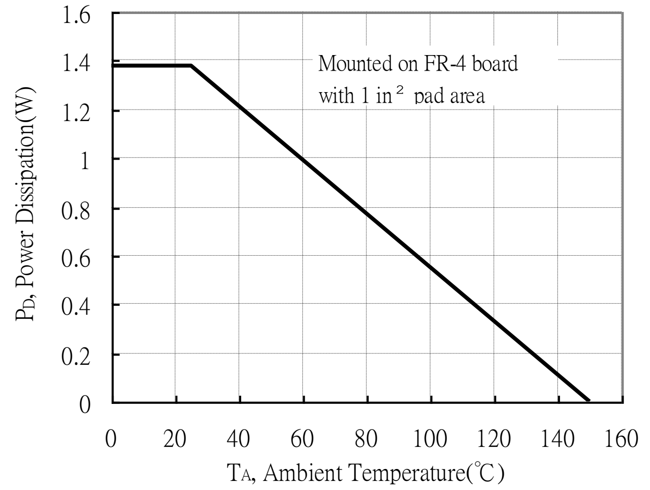


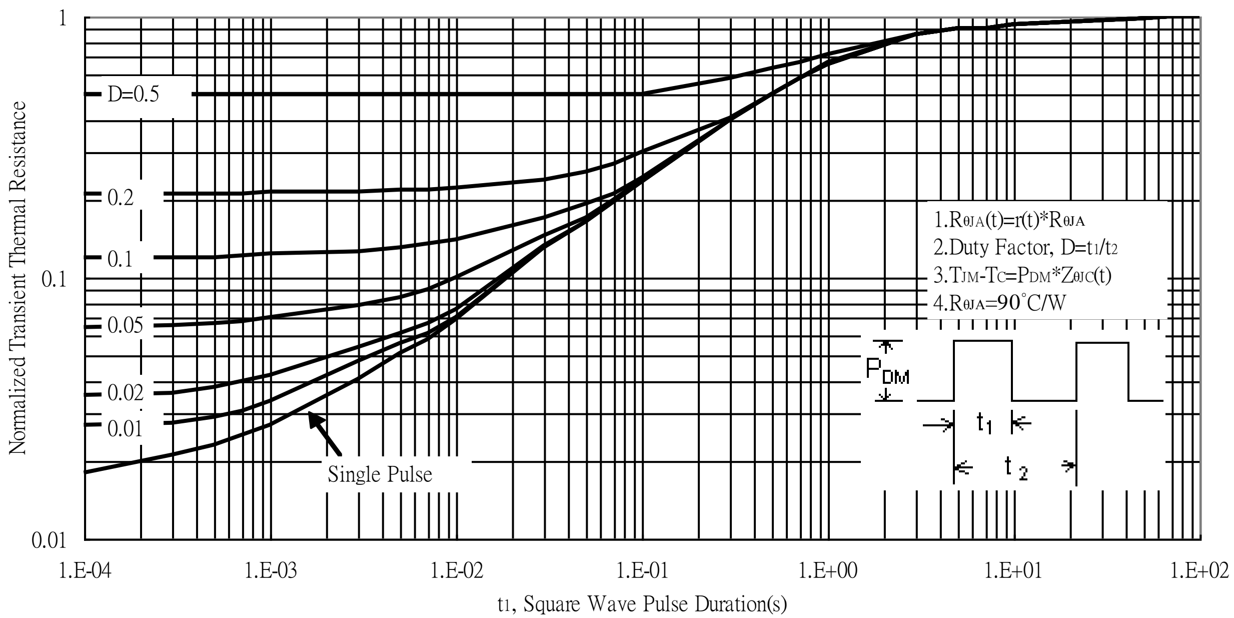




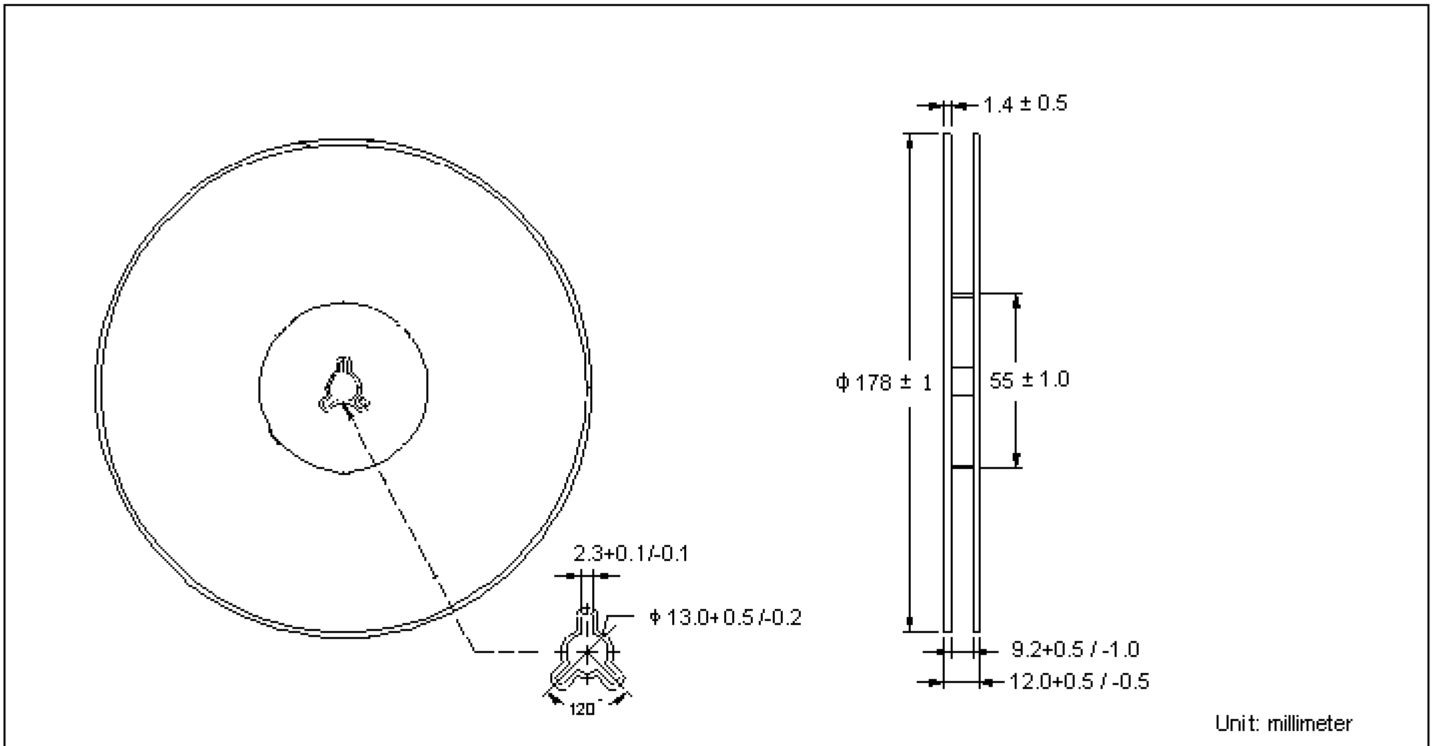
Typical Characteristics(Cont.)



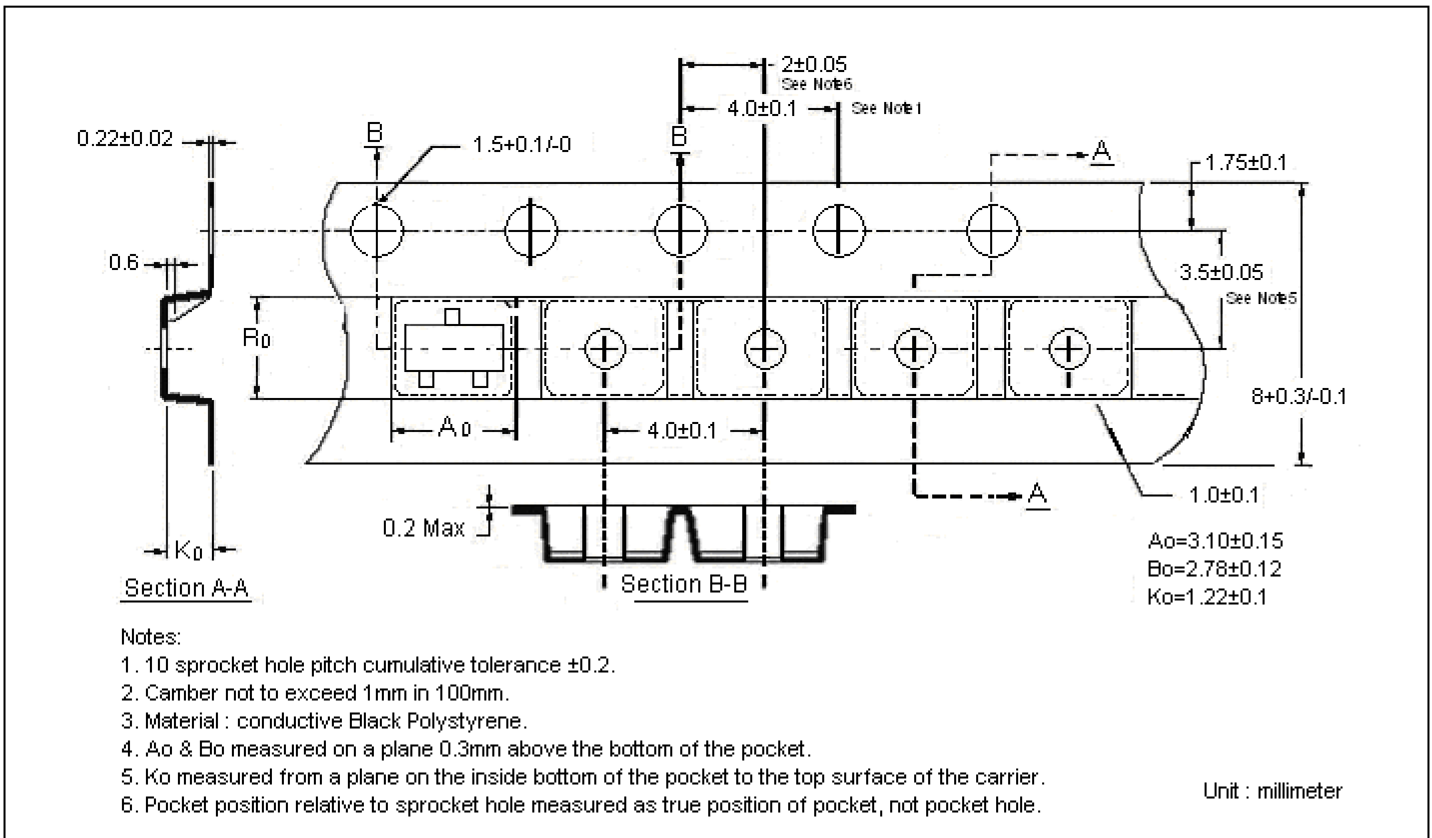




Reel Dimension



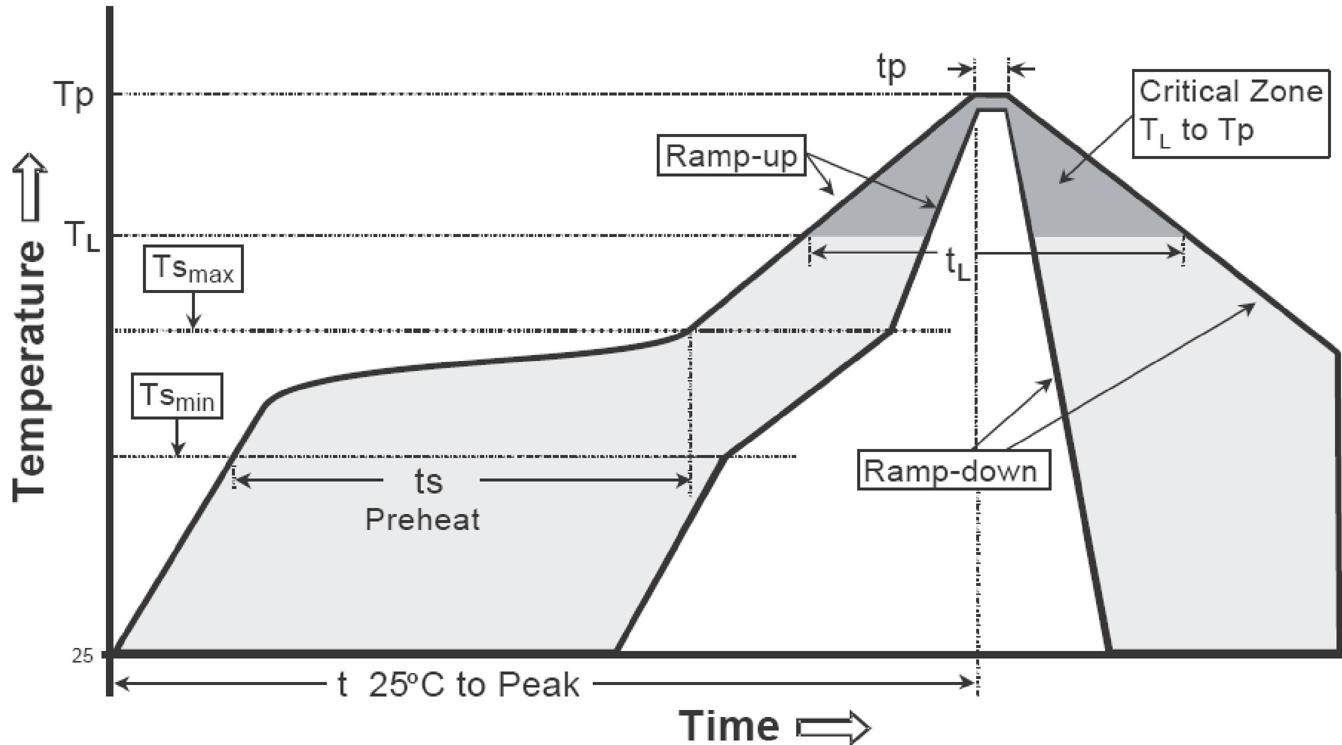
Carrier Tape Dimension



Recommended wave soldering condition

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

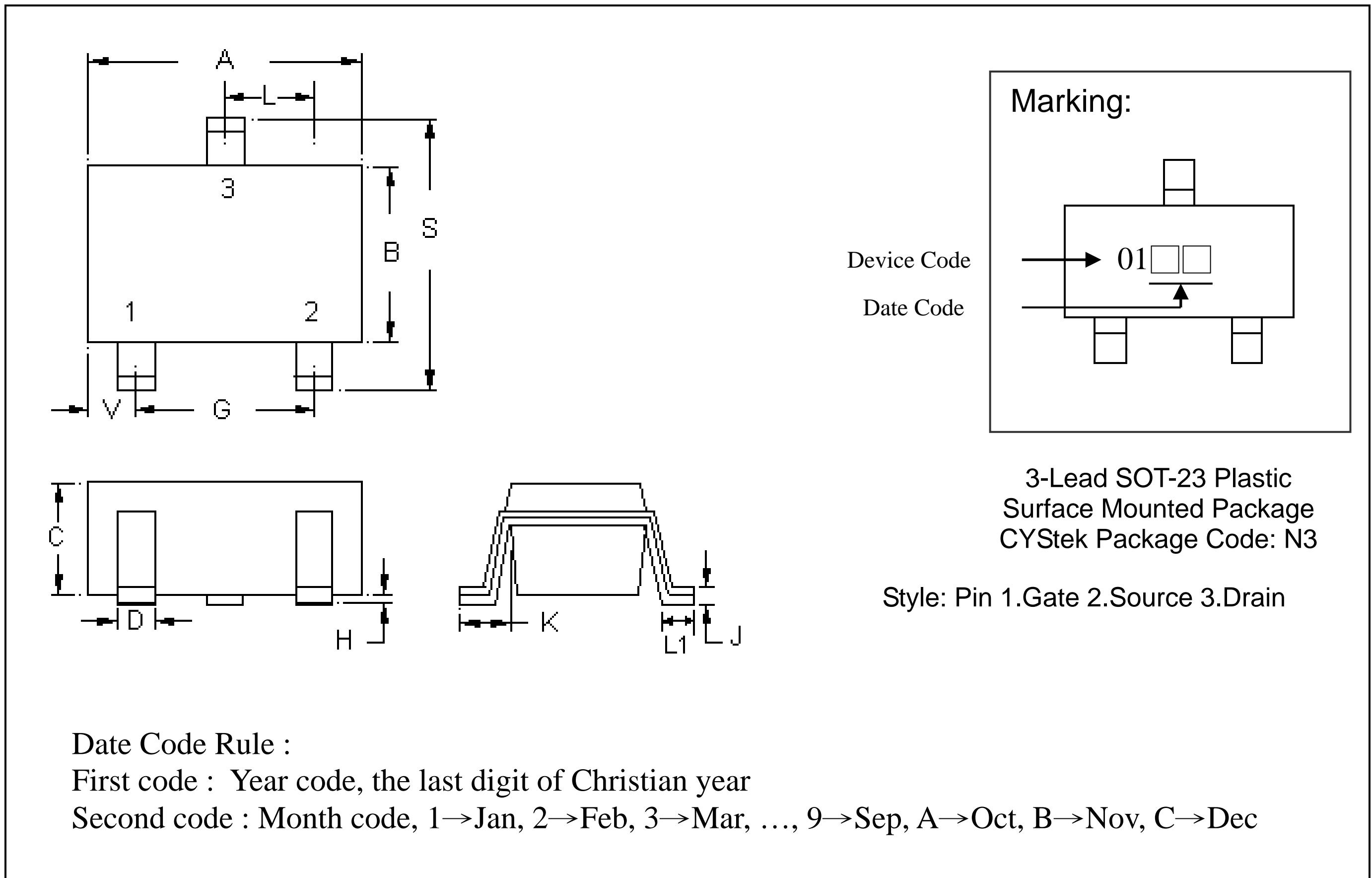
Recommended temperature profile for IR reflow



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(Ts min) −Temperature Max(Ts 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 (TL) − Time (tL)	183°C 60-150 seconds	217°C 60-150 seconds
Peak Temperature(TP)	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-23 Dimension



3-Lead SOT-23 Plastic
Surface Mounted Package
CYStek Package Code: N3

Style: Pin 1.Gate 2.Source 3.Drain

Date Code Rule :
First code : Year code, the last digit of Christian year
Second code : Month code, 1→Jan, 2→Feb, 3→Mar, …, 9→Sep, A→Oct, B→Nov, C→Dec

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1102	0.1204	2.80	3.04	J	0.0032	0.0079	0.08	0.20
B	0.0472	0.0669	1.20	1.70	K	0.0118	0.0266	0.30	0.67
C	0.0335	0.0512	0.89	1.30	L	0.0335	0.0453	0.85	1.15
D	0.0118	0.0197	0.30	0.50	S	0.0830	0.1161	2.10	2.95
G	0.0669	0.0910	1.70	2.30	V	0.0098	0.0256	0.25	0.65
H	0.0000	0.0040	0.00	0.10	L1	0.0118	0.0197	0.30	0.50

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.

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek ***semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.***
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.