-20V P-CHANNEL Enhancement Mode MOSFET

MTP2301V3

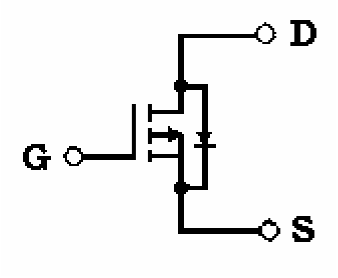
BV_{DSS}	-20V
I_D	-3.4A
$R_{DSON(MAX)}$@V_{GS}=-4.5V, I_D=-2.8A	79mΩ(typ.)
$R_{DSON(MAX)}$@V_{GS}=-2.5V, I_D=-2A	116mΩ(typ.)

Features

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

Equivalent Circuit

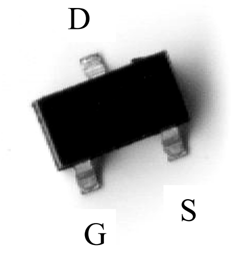
MTP2301V3



G : Gate
S : Source
D : Drain

Outline

TSOT-23



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)	$R_{th,ja}$	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	-	3	10	nC	V_{DS}=-10V, I_D=-3A, V_{GS}=-2.5V,
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	

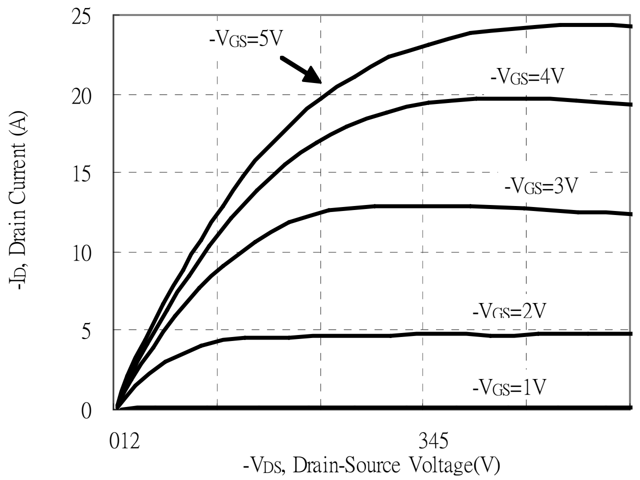
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Ordering Information

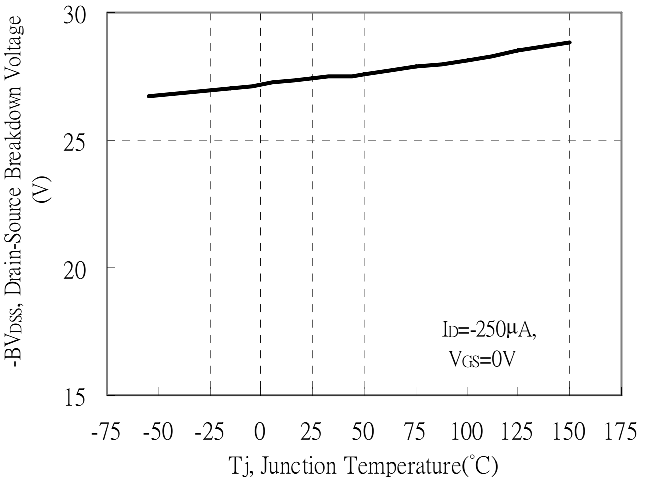
Device	Package	Shipping	Marking
MTP2301V3	TSOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel	01

Typical Characteristics

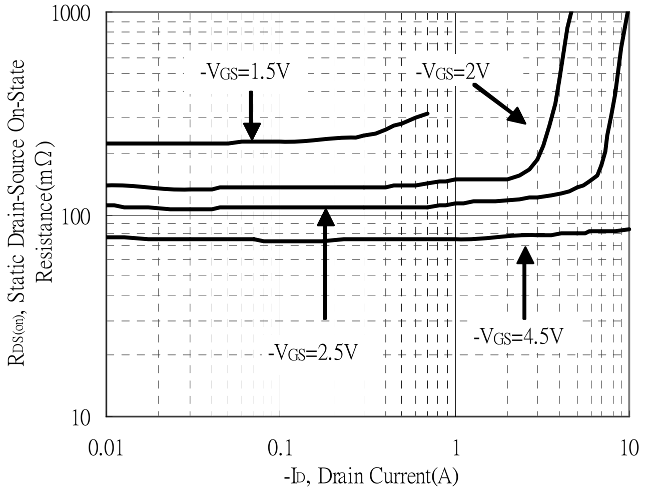
Typical Output Characteristics



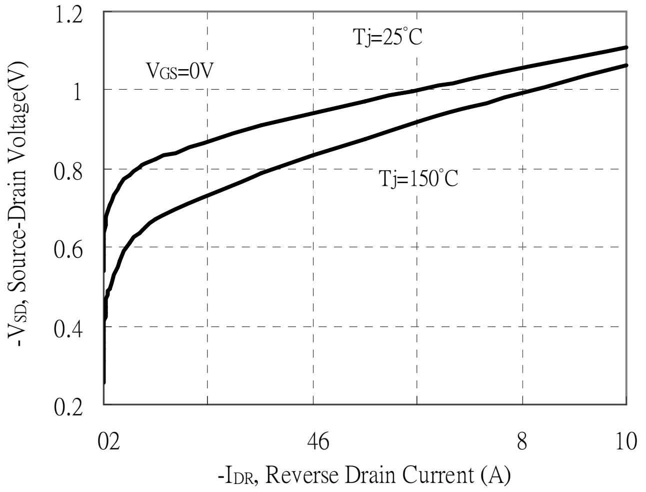
Brekdown Voltage vs Ambient Temperature



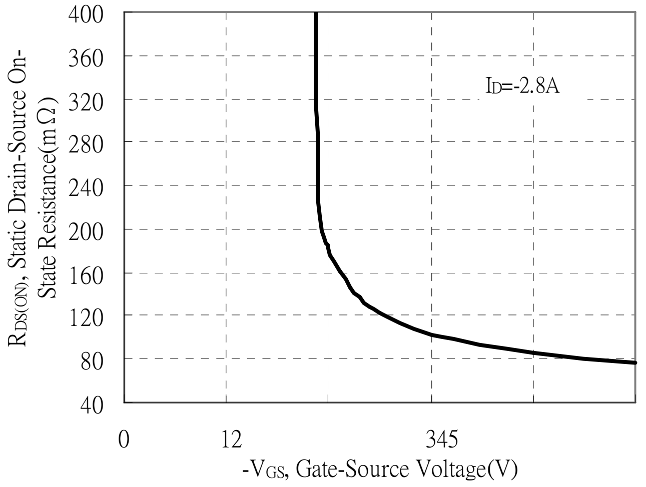
Static Drain-Source On-State resistance vs Drain Current



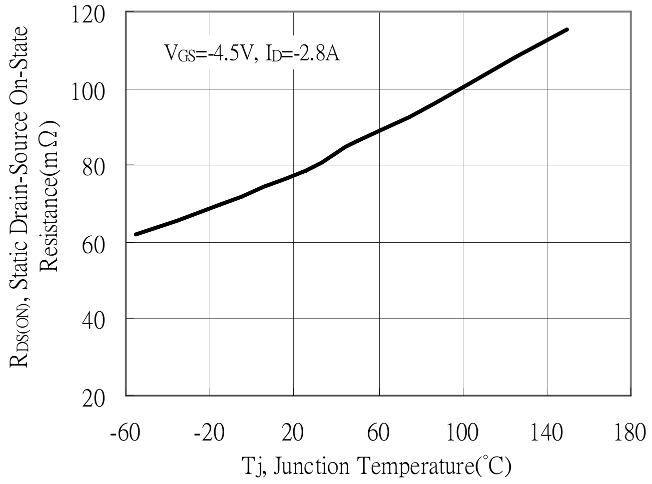
Reverse Drain Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

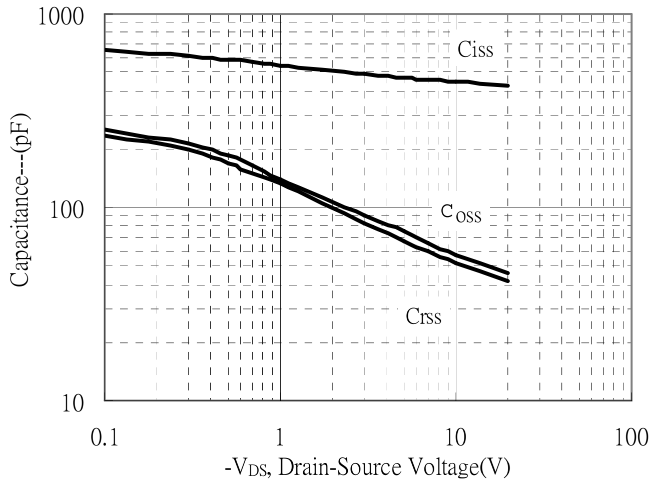


Drain-Source On-State Resistance vs Junction Tempearture

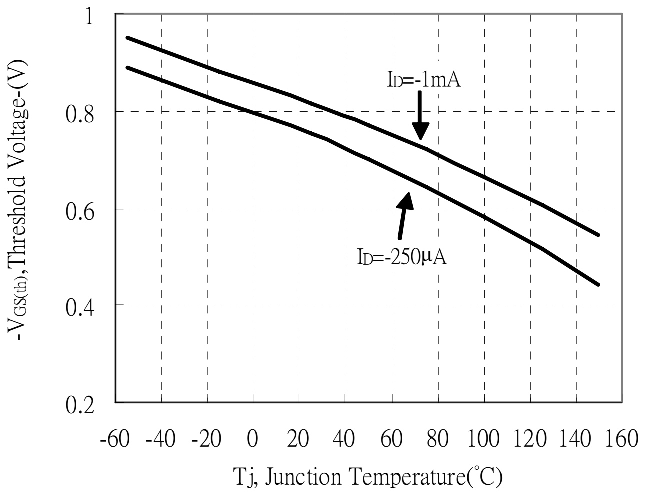


Typical Characteristics(Cont.)

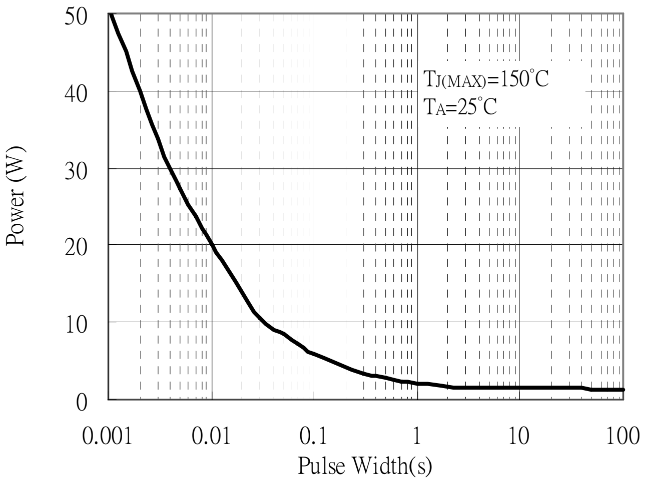
Capacitance vs Drain-to-Source Voltage



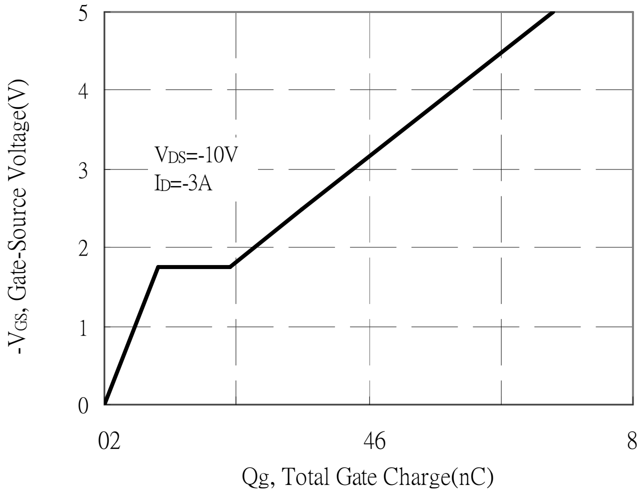
Threshold Voltage vs Junction Tempearture



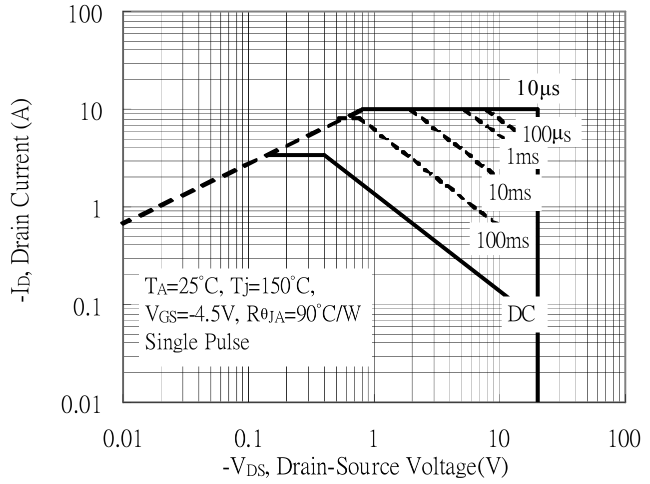
Single Pulse Power Rating, Junction to Ambient
(Note 1 on page 2)



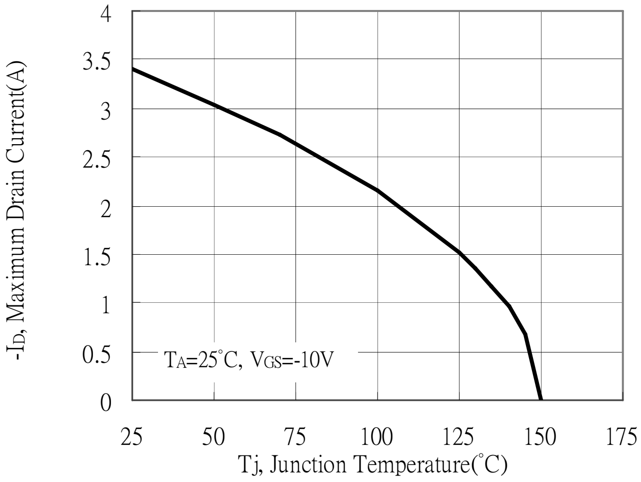
Gate Charge Characteristics



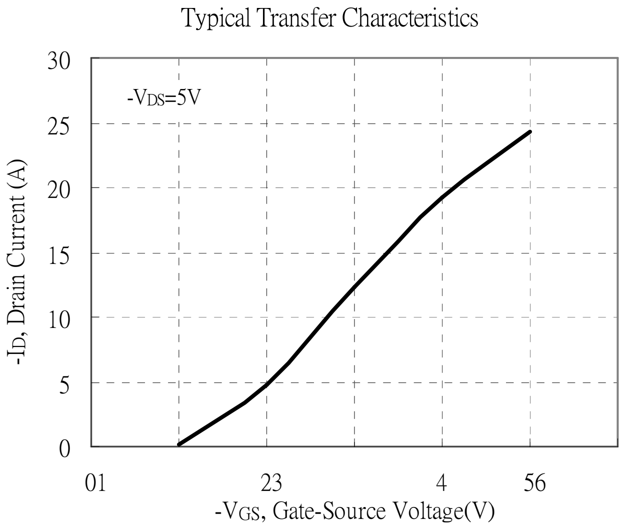
Maximum Safe Operating Area

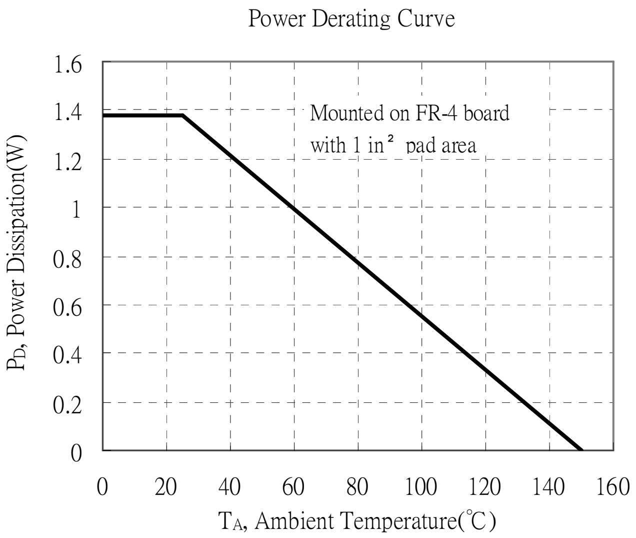


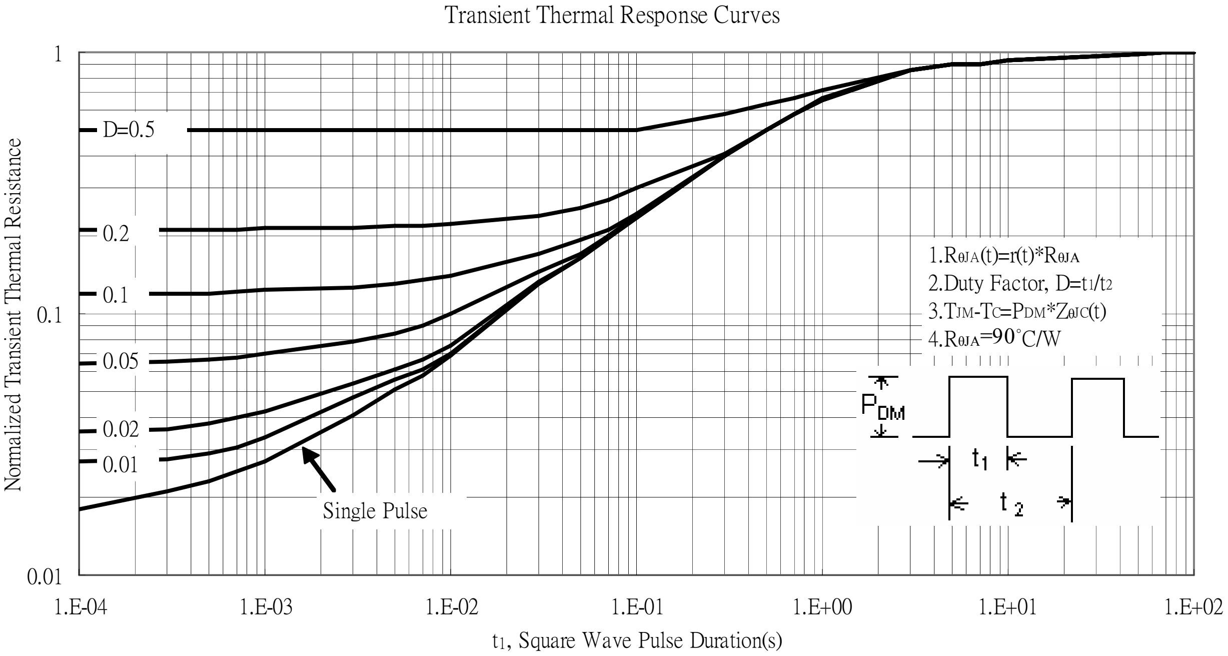
Maximum Drain Current vs JunctionTemperature



Typical Characteristics(Cont.)

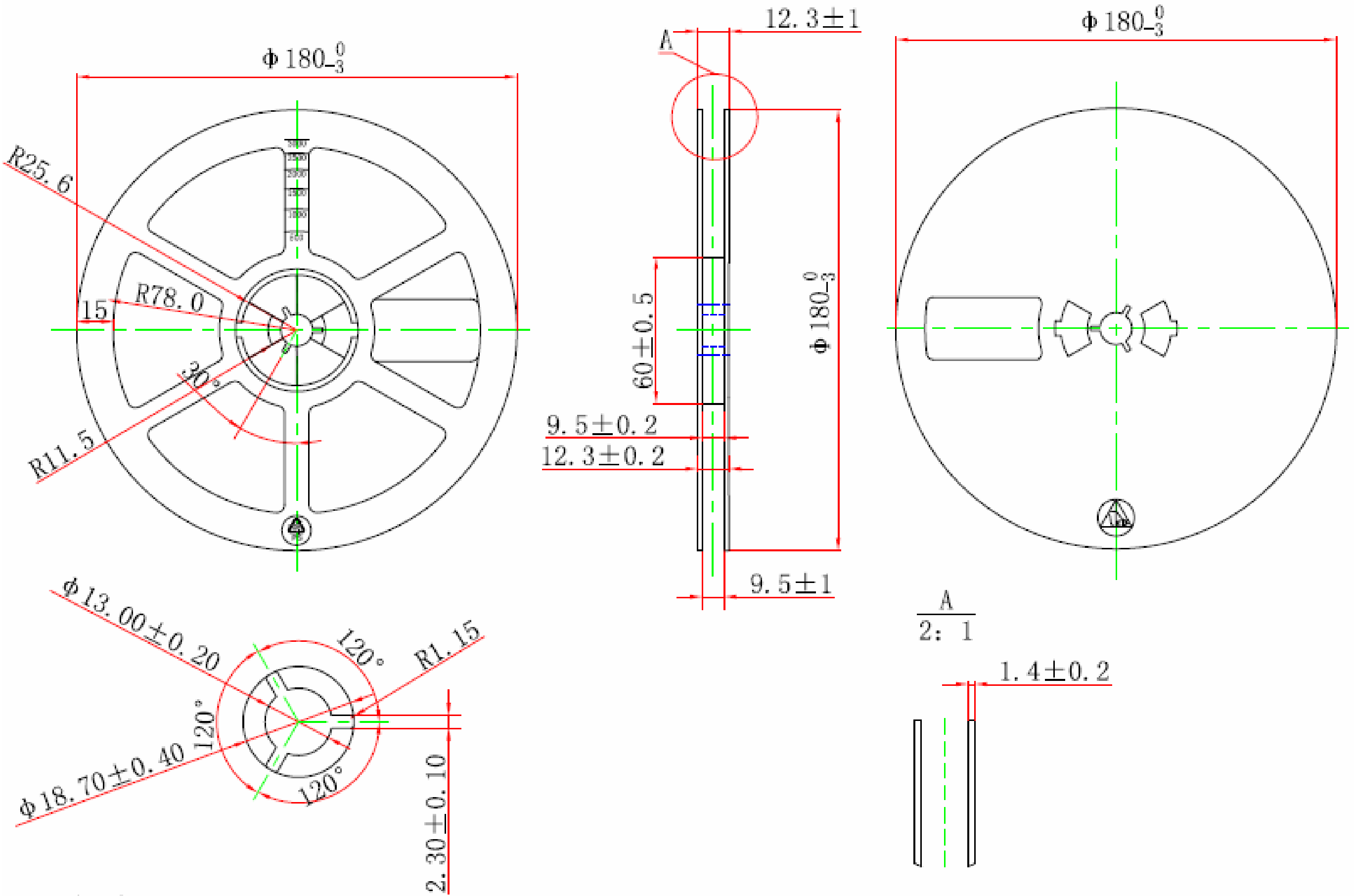

Typical Transfer Characteristics


Power Derating Curve


Transient Thermal Response Curves

1. $R_{\theta JA}(t)=r(t)*R_{\theta JA}$
2. Duty Factor, $D=t_1/t_2$
3. $T_{JM}-T_C=P_{DM}*Z_{\theta JC}(t)$
4. $R_{\theta JA}$=90°C/W

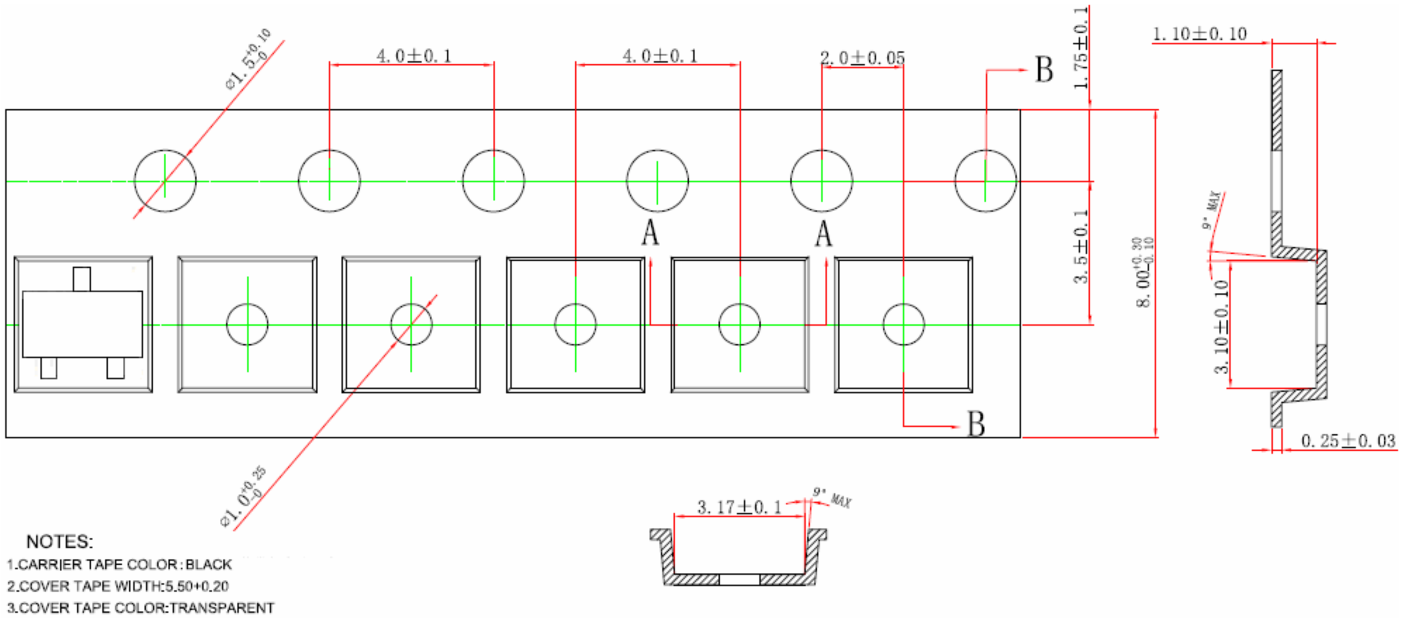
Reel Dimension



NOTES:

1. ALL DIM IN mm
2. ESD-SURFACE RESISTIVITY 10^{5}~ 10^{11}OHMS/SQ
3. GENERAL TOLERANCE± 0.25;
4. THE DERECTION OF VIEW :

Carrier Tape Dimension



NOTES:

1.CARRIER TAPE COLOR:BLACK

2.COVER TAPE WIDTH:5.50+0.20

3.COVER TAPE COLOR:TRANSPARENT

5. ANTISTATIC COATED 10^5~ 10^{11}OHMS/SQ.

6.10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.20MAX.

7.CAMBER NOT TO EXCEED 1 MM IN 100 MM

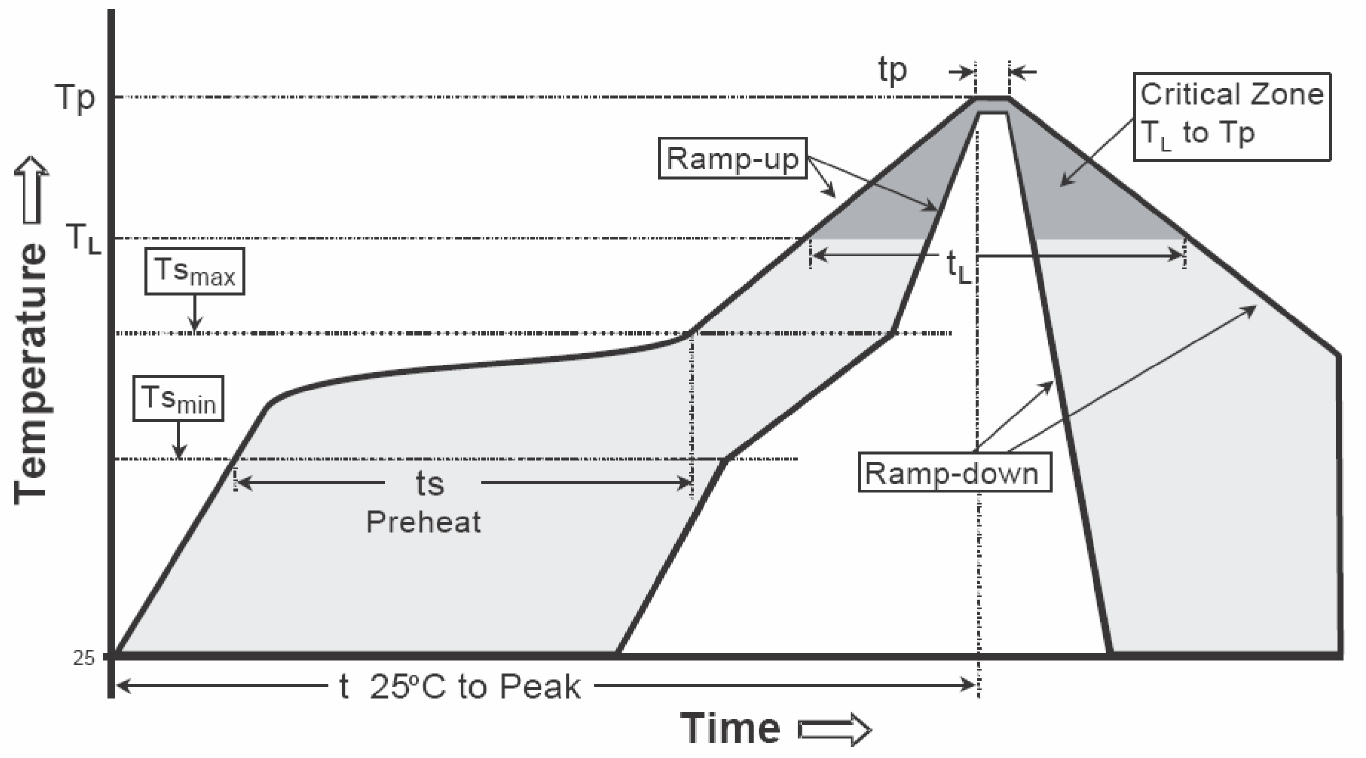
8. ALL DIMS IN mm.

9. THE DERECTION OF VIEW:

Recommended wave soldering condition

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

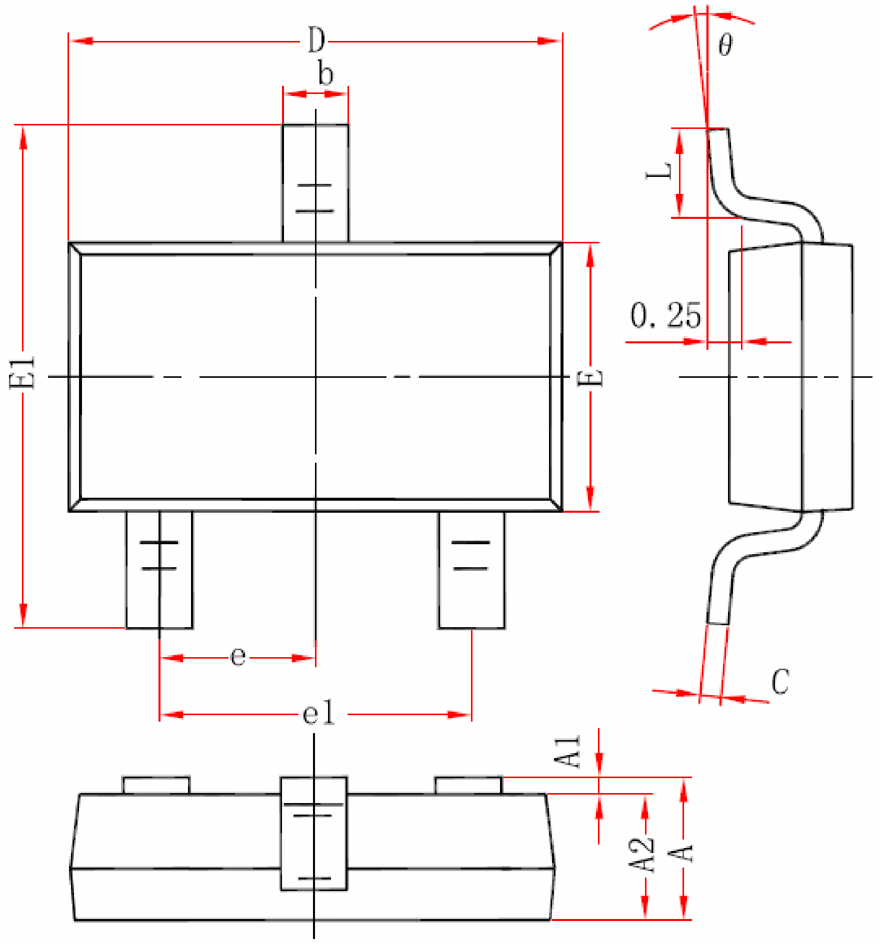
Recommended temperature profile for IR reflow



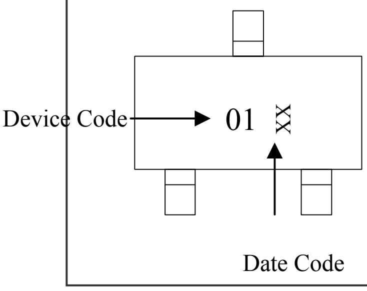
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − 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.

TSOT-23 Dimension



Marking:



3-Lead TSOT-23 Plastic
Surface Mounted Package
CYStek Package Code: V3

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

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.028	0.035	0.700	0.900	E	0.063	0.067	1.600	1.700
A1	0.000	0.004	0.000	0.100	E1	0.104	0.116	2.650	2.950
A2	0.028	0.031	0.700	0.800	e	0.037(BSC)		0.95(BSC)	
b	0.014	0.020	0.350	0.500	e1	0.075(BSC)		1.90(BSC)	
c	0.003	0.008	0.080	0.020	L	0.012	0.024	0.300	0.600
D	0.111	0.119	2.820	3.020	θ	0°	8°	0°	8°

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.