

50V N-Channel Enhancement Mode MOSFET

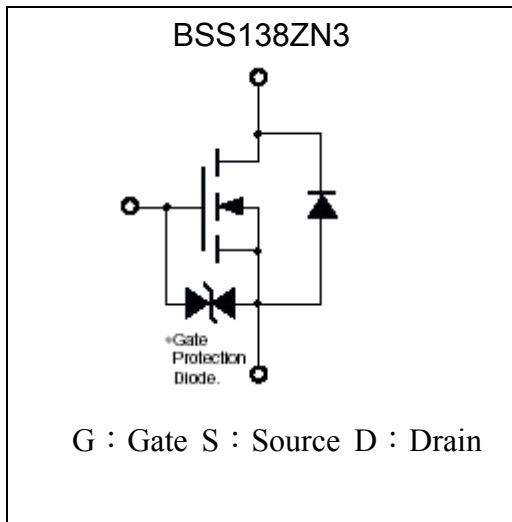
BSS138ZN3

BV _{DSS}	50V
I _D	380mA
R _{DS(on)} @V _{GS} =10V, I _D =220mA	1.1 Ω (typ)
R _{DS(on)} @V _{GS} =4.5V, I _D =220mA	1.3 Ω (typ)
R _{DS(on)} @V _{GS} =2.5V, I _D =220mA	1.7 Ω (typ)
R _{DS(on)} @V _{GS} =4V, I _D =100mA	1.3 Ω (typ)
R _{DS(on)} @V _{GS} =2.5V, I _D =80mA	1.6 Ω (typ)

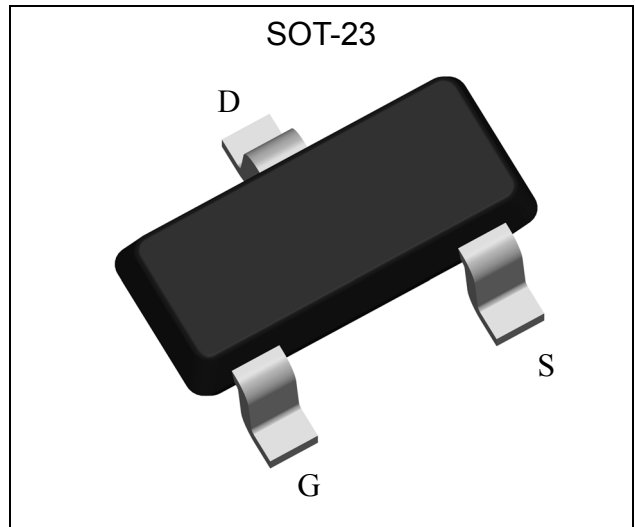
Features

- Simple drive requirement
- Small package outline
- Pb-free lead plating and halogen-free package

Symbol

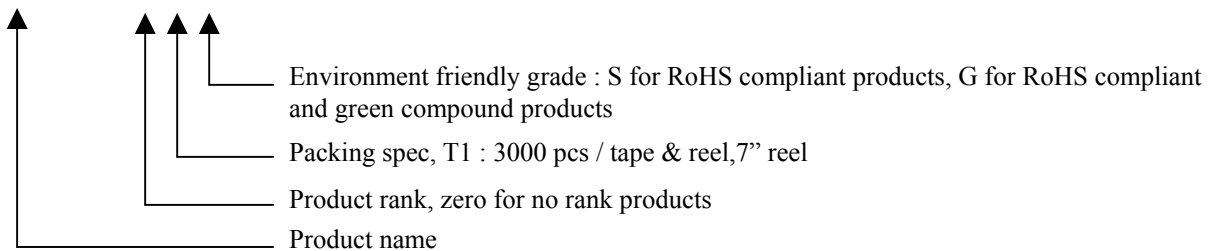


Outline



Ordering Information

Device	Package	Shipping
BSS138ZN3-0-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}	50	V
Gate-Source Voltage		V _{GS}	±20	
Continuous Drain Current @ TA=25°C, VGS=4.5V (Note 3)		I _D	380	mA
Continuous Drain Current @ TA=85°C, VGS=4.5V (Note 3)			270	
Pulsed Drain Current (Notes 1, 2)		I _{DM}	1.5	A
Maximum Power Dissipation (Note 3)	TA=25°C	P _D	350	mW
	TA=70°C		224	
ESD susceptibility		V _{ESD}	1500 (Note 4)	V
Operating Junction and Storage Temperature		T _j , T _{stg}	-55~+150	°C

- Note : 1. Pulse width limited by maximum junction temperature.
 2. Pulse width ≤ 300μs, duty cycle ≤ 2%.
 3. Surface mounted on FR-4 board.
 4. Human body model, 1.5kΩ in series with 100pF

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient(PCB mounted)	R _{th,ja}	357	°C/W

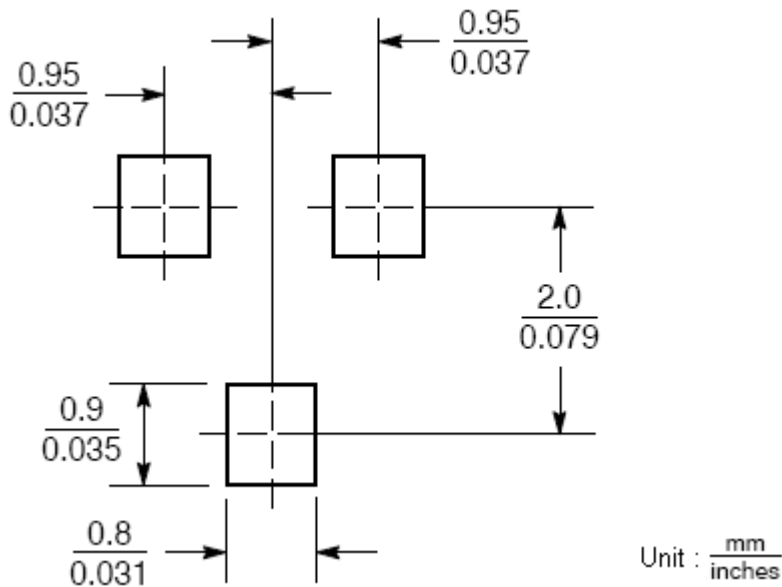
Electrical Characteristics (Tj=25°C, unless otherwise noted)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	50	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	0.8	-	1.5		V _{DS} =V _{GS} , I _D =250μA
I _{GSS}	-	-	±10	μA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1		V _{DS} =50V, V _{GS} =0V
	-	-	10		V _{DS} =40V, V _{GS} =0V (T _j =70°C)
*R _{Ds(ON)}	-	1.1	1.3	Ω	V _{GS} =10V, I _D =220mA
	-	1.3	1.7		V _{GS} =4.5V, I _D =220mA
	-	1.7	5		V _{GS} =2.5V, I _D =220mA
	-	1.3	3		V _{GS} =4V, I _D =100mA
	-	1.6	5		V _{GS} =2.5V, I _D =80mA
*G _{FS}	0.4	0.6	-	S	V _{DS} =10V, I _D =220mA
Dynamic					
C _{iss}	-	43	-	pF	V _{DS} =10V, V _{GS} =0V, f=1MHz
C _{oss}	-	7.2	-		
C _{rss}	-	4	-		

$t_{d(ON)}$	-	4	-	ns	$V_{DS}=30V, I_D=100mA, V_{GS}=4.5V$ $R_G=10\Omega$
t_r	-	7	-		
$t_{d(OFF)}$	-	15	-		
t_f	-	15	-		
Q_g	-	0.76	-	nC	$V_{DS}=30V, I_D=250mA, V_{GS}=4.5V$
Q_{gs}	-	0.085	-		
Q_{gd}	-	0.26	-		
Source-Drain Diode					
$*V_{SD}$	-	0.79	1.2	V	$V_{GS}=0V, I_S=200mA$

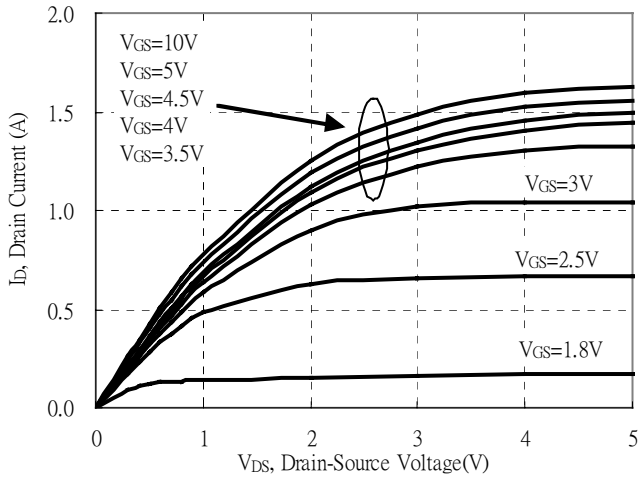
*Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Recommended Soldering Footprint

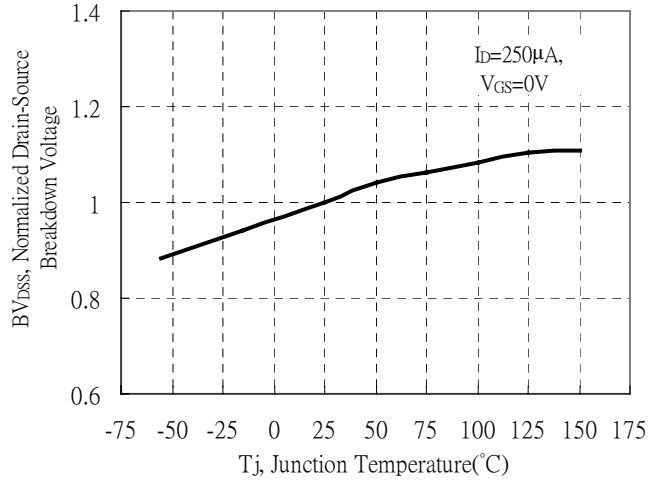


Typical Characteristics

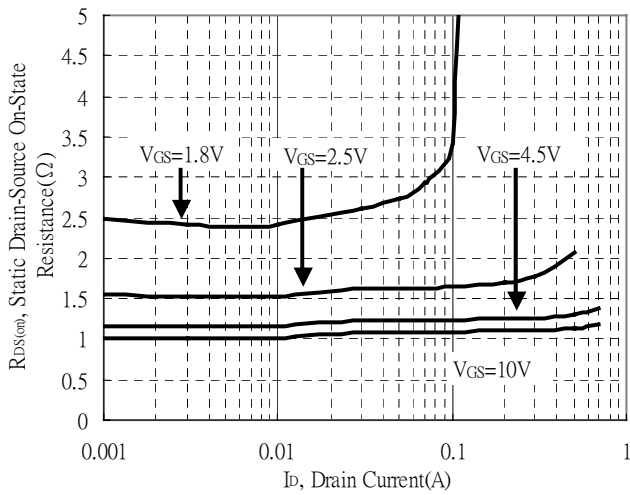
Typical Output Characteristics



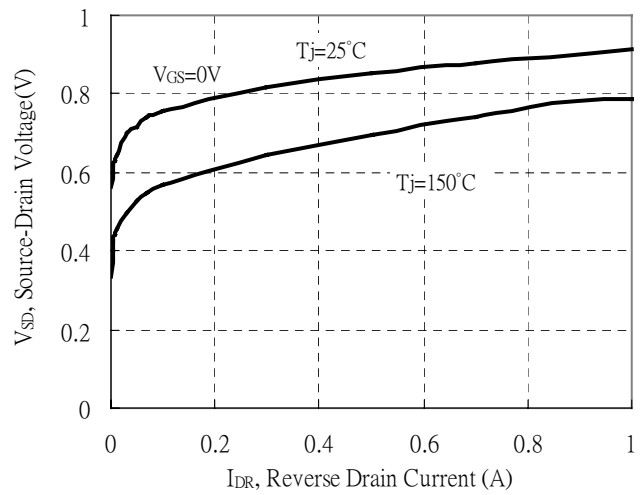
Breakdown Voltage vs Ambient Temperature



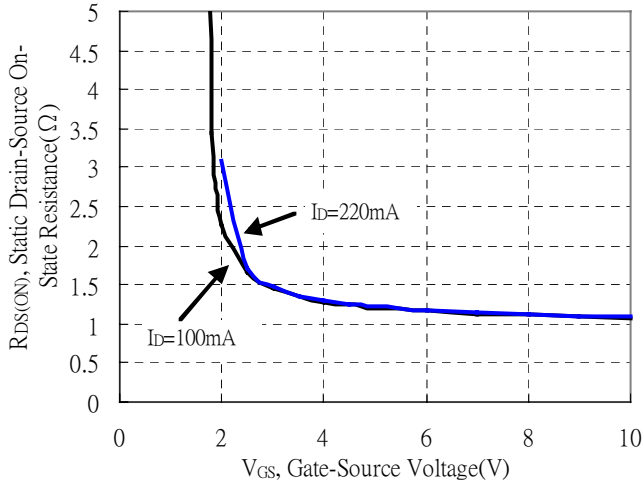
Static Drain-Source On-State resistance vs Drain Current



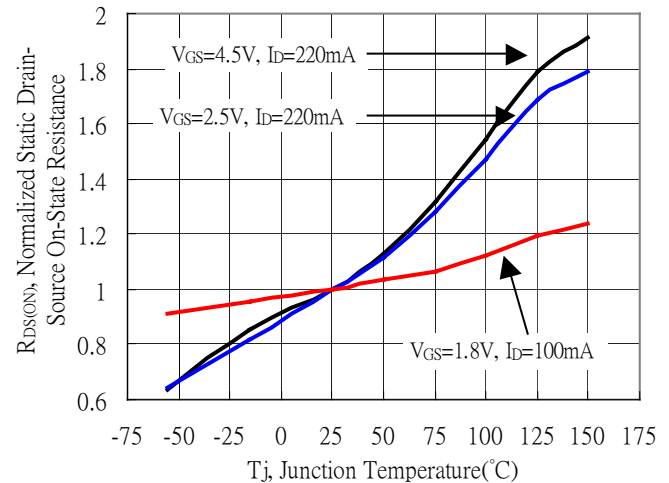
Reverse Drain Current vs Source-Drain Voltage



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

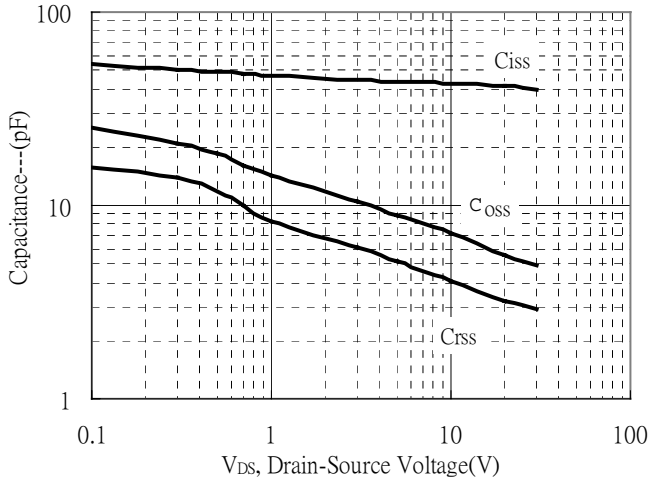


Drain-Source On-State Resistance vs Junction Temperature

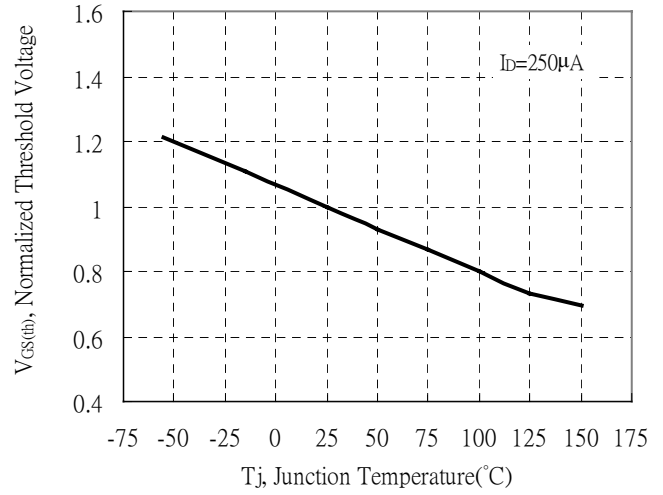


Typical Characteristics(Cont.)

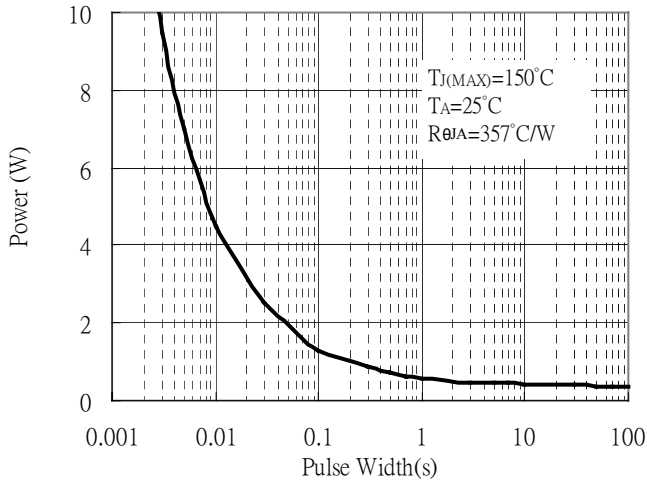
Capacitance vs Drain-to-Source Voltage



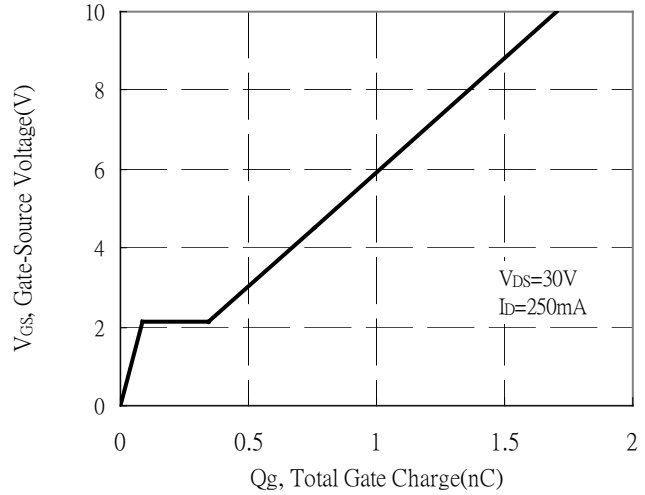
Threshold Voltage vs Junction Temperature



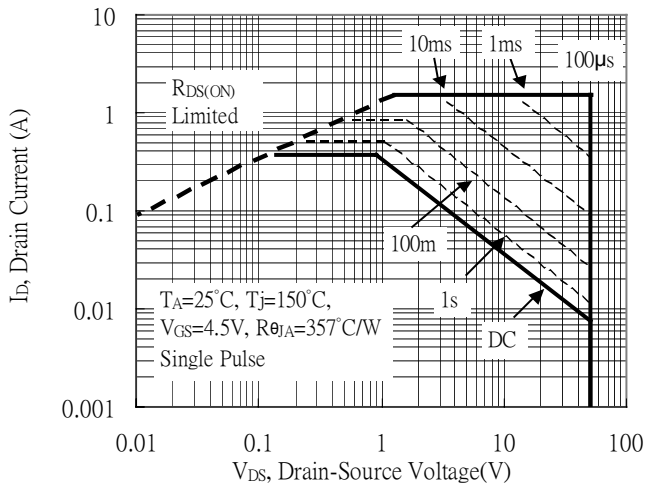
Single Pulse Power Rating, Junction to Ambient
 (Note on page 2)



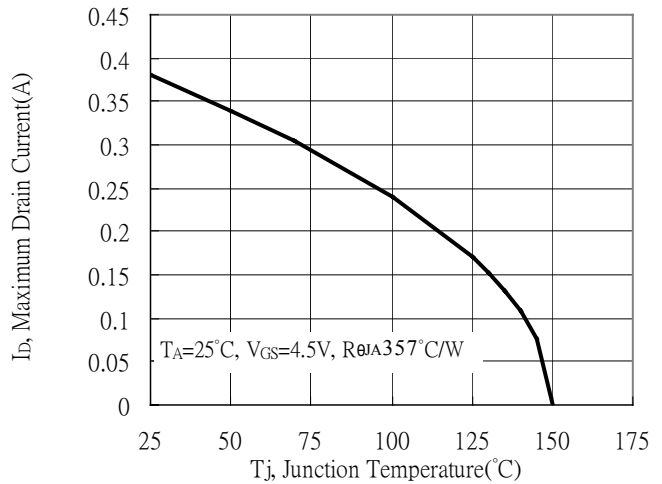
Gate Charge Characteristics



Maximum Safe Operating Area

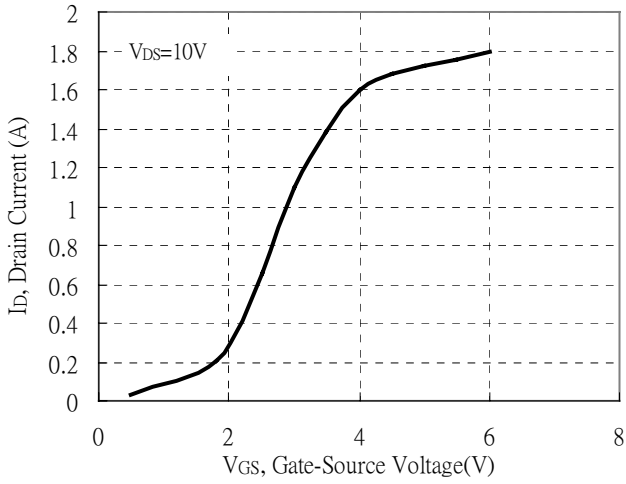


Maximum Drain Current vs Junction Temperature

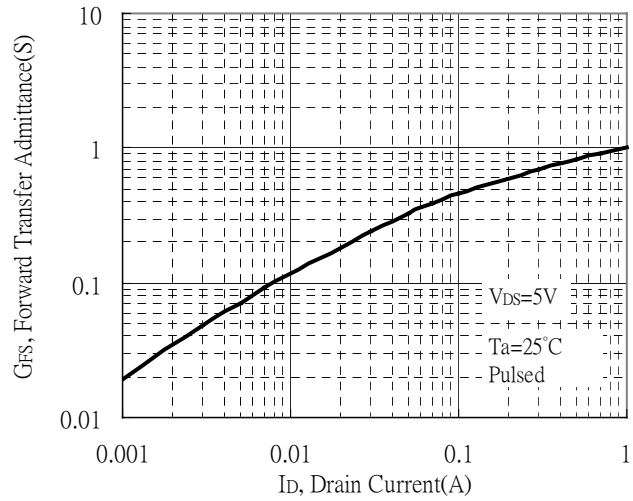


Typical Characteristics(Cont.)

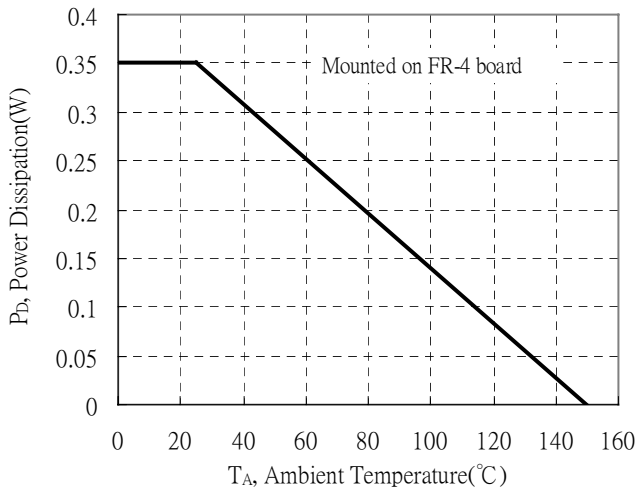
Typical Transfer Characteristics



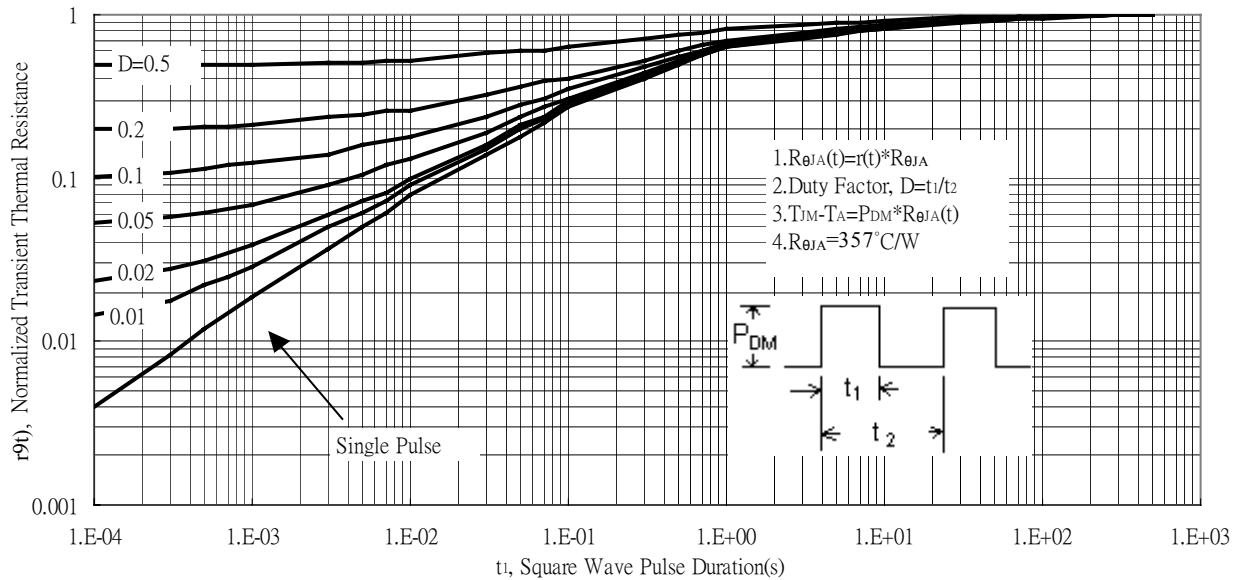
Forward Transfer Admittance vs Drain Current



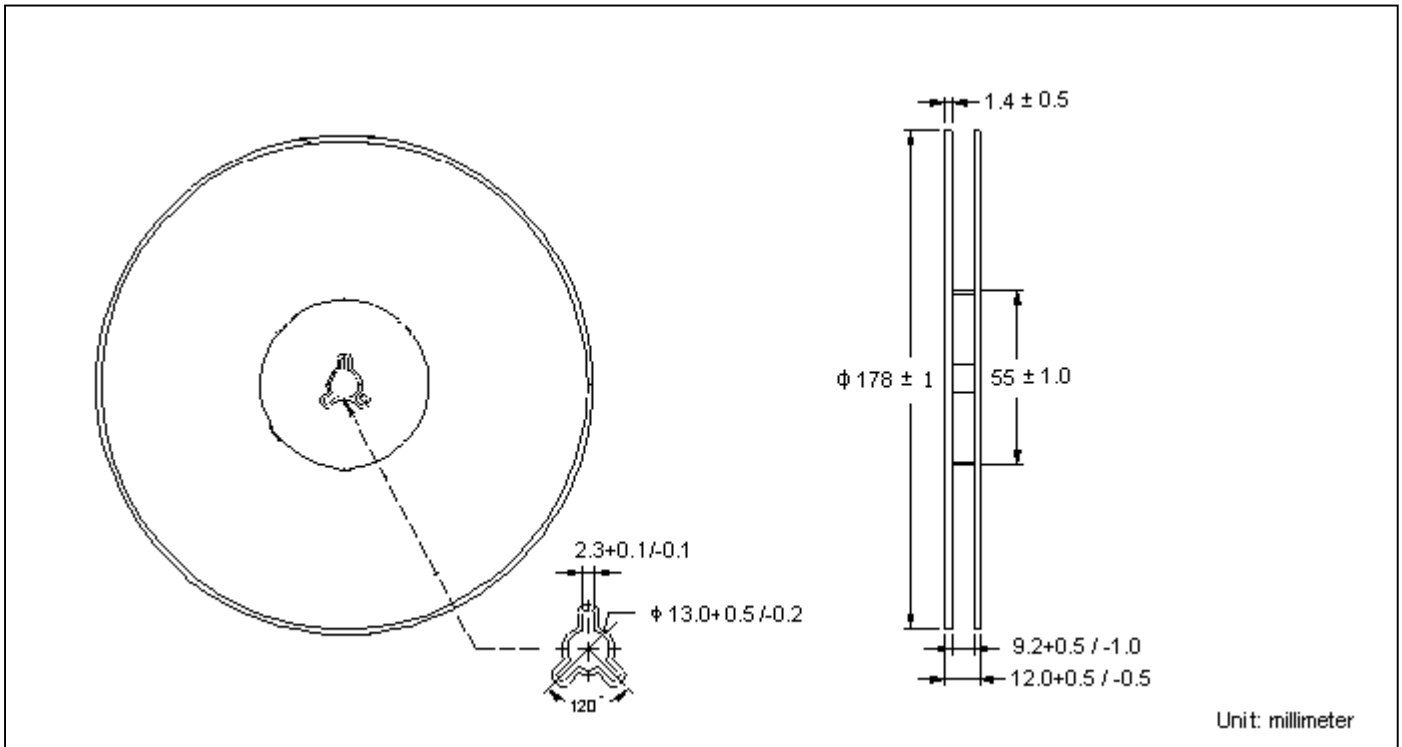
Power Derating Curve



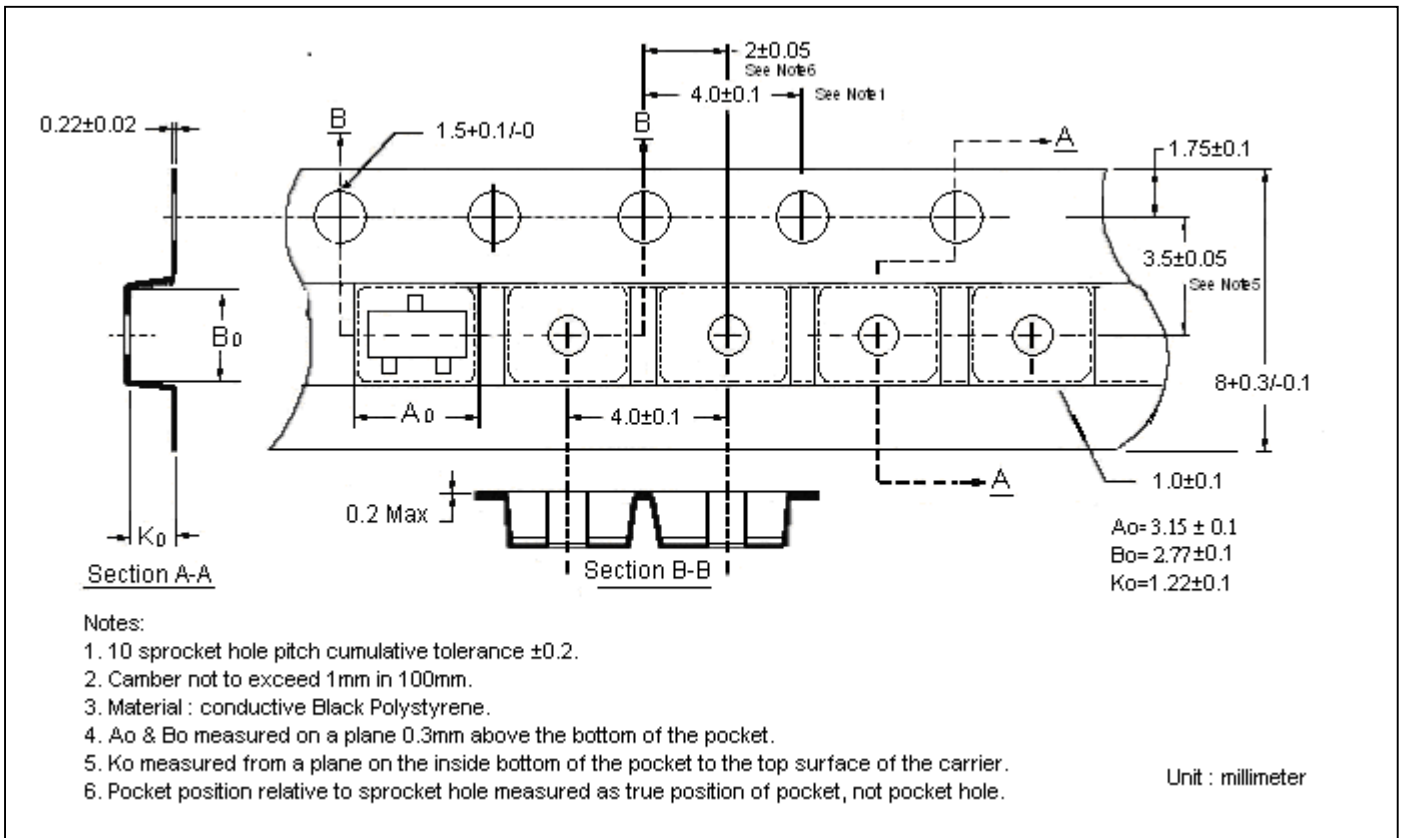
Transient Thermal Response Curves



Reel Dimension



Carrier Tape Dimension



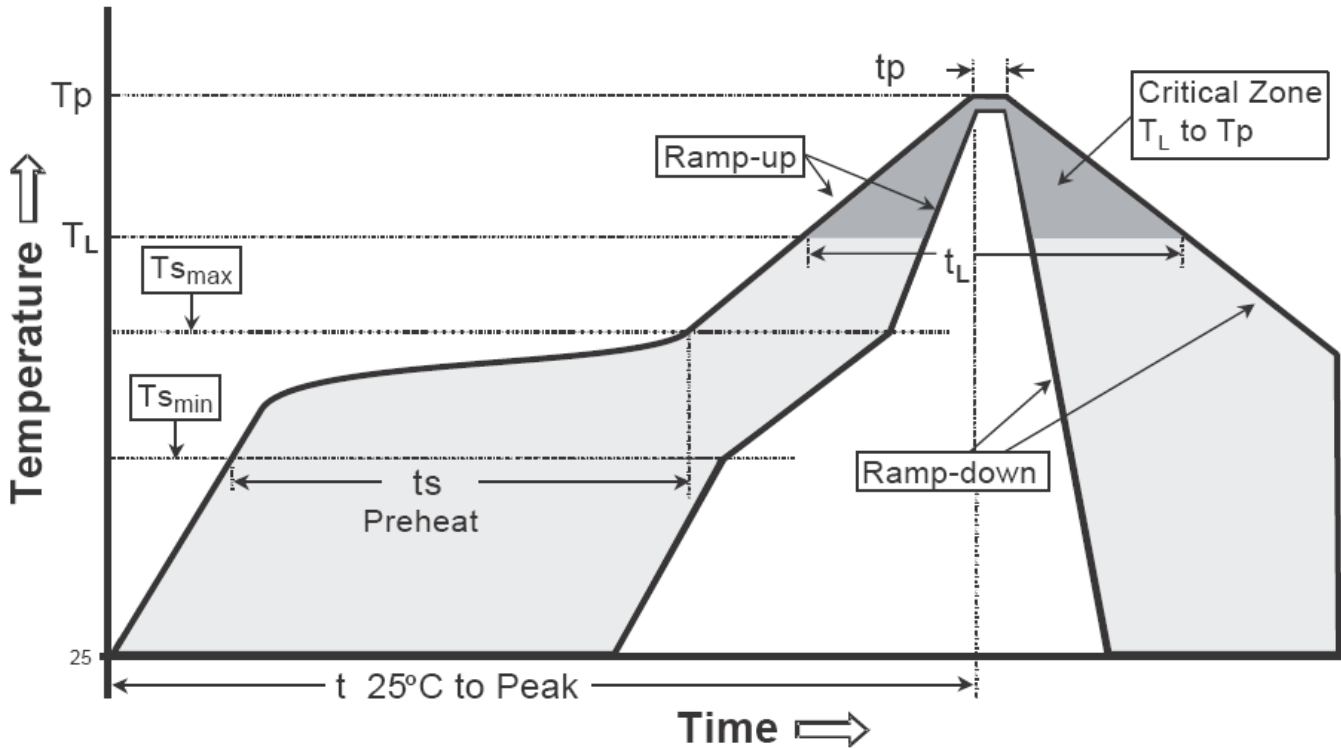
Notes:

1. 10 sprocket hole pitch cumulative tolerance ± 0.2 .
2. Camber not to exceed 1mm in 100mm.
3. Material : conductive Black Polystyrene.
4. A_0 & B_0 measured on a plane 0.3mm above the bottom of the pocket.
5. K_0 measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Recommended wave soldering condition

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

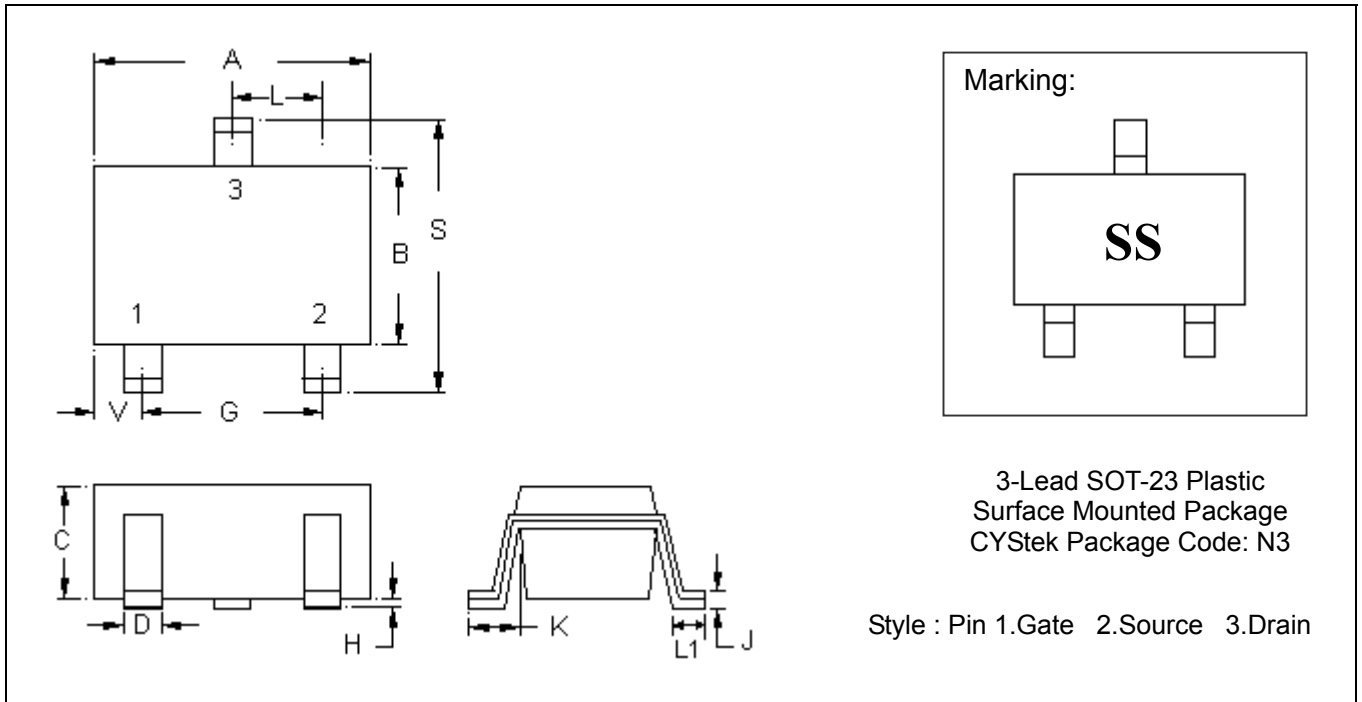
Recommended temperature profile for IR reflow



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)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (TL)	183°C	217°C
- Time (tL)	60-150 seconds	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



*:Typical

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	0.0551	1.20	1.40	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	0.1004	2.10	2.55
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.

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