

30V N-Channel Enhancement Mode MOSFET

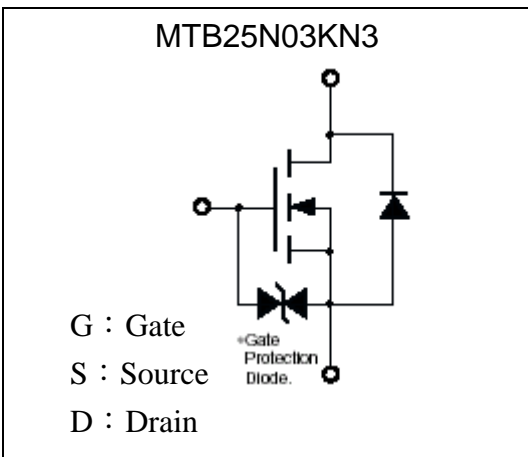
MTB25N03KN3

BV _{DSS}	30V
I _D @ V _{GS} =10V, T _A =25°C	6.5A
R _{DS(on)(TYP)} @ V _{GS} =10V, I _D =4.2A	17.9mΩ
R _{DS(on)(TYP)} @ V _{GS} =4.5V, I _D =3.5A	24.4mΩ

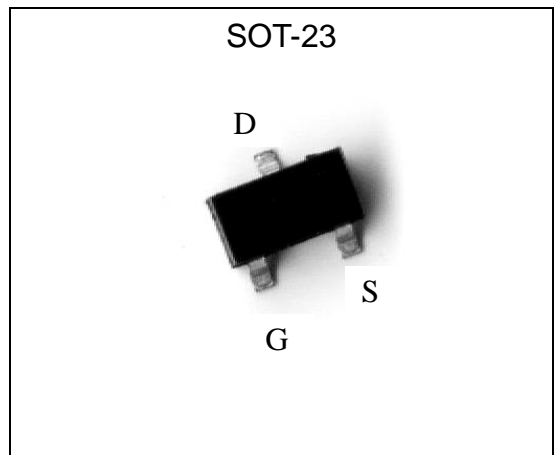
Features

- Lower gate charge
- ESD protected gate
- Pb-free lead plating and Halogen-free package

Equivalent Circuit

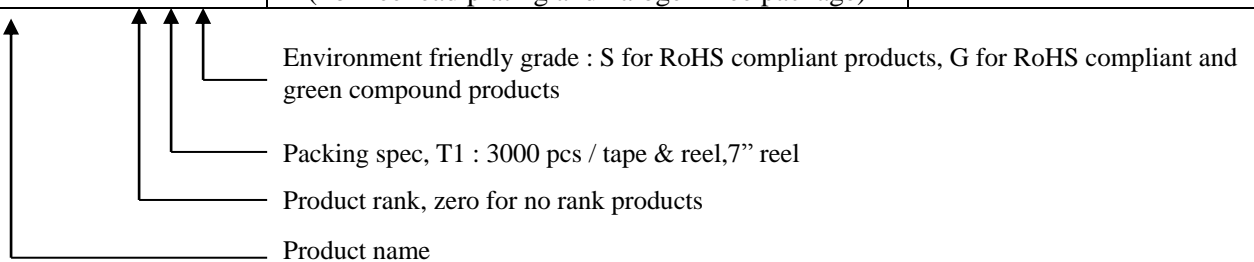


Outline



Ordering Information

Device	Package	Shipping
MTB25N03KN3-0-T1-G	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel





Absolute Maximum Ratings ($T_C=25^{\circ}\text{C}$, unless otherwise noted)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 16	
Continuous Drain Current	$T_A=25^{\circ}\text{C}, V_{GS}=10\text{V}$	I_D	6.5	A
	$T_A=70^{\circ}\text{C}, V_{GS}=10\text{V}$		5.2	
Pulsed Drain Current		I_{DM}	50 (Note 1 & 2)	
Power Dissipation	$T_A=25^{\circ}\text{C}$	P_D	1.38 (Note 3)	W
	$T_A=70^{\circ}\text{C}$		0.88 (Note 3)	
Operating Junction and Storage Temperature		T_j, T_{stg}	-55 ~ +150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction to Ambient, max	$R_{\theta JA}$	90 *2	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction to Case, max	$R_{\theta JC}$	20	

- Note : 1. Pulse width limited by maximum junction temperature.
 2. Duty cycle $\leq 1\%$.
 3. Surface mounted on 1 in² copper pad of FR4 board, $t \leq 10\text{s}$; $270^{\circ}\text{C}/\text{W}$ when mounted on min. copper pad.

Electrical Characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	30	-	-	V	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$
$V_{GS(th)}$	1	-	2.5		$V_{DS}=V_{GS}, I_D=250\mu\text{A}$
I_{GSS}	-	-	± 20	μA	$V_{GS}=\pm 16\text{V}, V_{DS}=0\text{V}$
I_{DSS}	-	-	1		$V_{DS}=24\text{V}, V_{GS}=0\text{V}$
	-	-	10		$V_{DS}=24\text{V}, V_{GS}=0\text{V}, T_j=55^{\circ}\text{C}$
* $R_{DS(ON)}^1$	-	17.9	23.5	m Ω	$V_{GS}=10\text{V}, I_D=4.2\text{A}$
	-	24.4	32.0		$V_{GS}=4.5\text{V}, I_D=2\text{A}$
* G_{FS}^1	-	3.7	-	S	$V_{DS}=10\text{V}, I_D=1\text{A}$
Dynamic					
C_{iss}	-	300	-	pF	$V_{DS}=15\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$
C_{oss}	-	95	-		
C_{rss}	-	50	-		
* $t_{d(ON)}^{1\ 2}$	-	4.8	-	ns	$V_{DS}=15\text{V}, I_D=1\text{A}, V_{GS}=10\text{V}, R_G=6\Omega$
* $t_r^{1\ 2}$	-	18	-		
* $t_{d(OFF)}^{1\ 2}$	-	17.6	-		
* $t_f^{1\ 2}$	-	6.4	-		

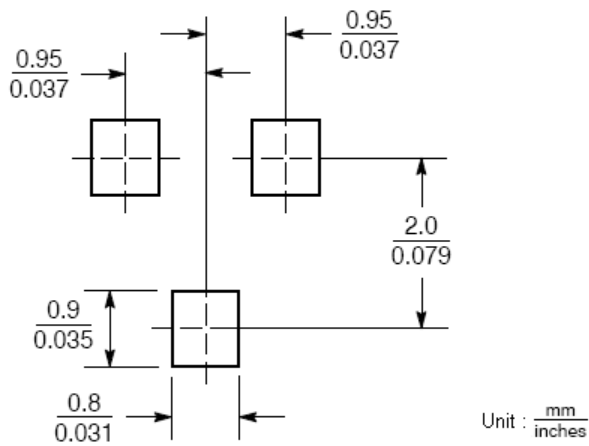
*Qg ^{1 2} (V _{GS} =10V)	-	7.8	-	nC	V _{DS} =15V, I _D =4A, V _{GS} =10V
*Qg ^{1 2} (V _{GS} =4.5V)	-	4.2	-		
*Qgs ^{1 2}	-	1	-		
*Qgd ^{1 2}	-	2	-		
Source-Drain Diode					
I _S	-	-	2	A	
I _{SM} ³	-	-	8		
V _{SD} ¹	-	0.74	1	V	I _S =1A, V _{GS} =0V
trr ¹	-	9.1	-	ns	I _F =1A, dI _F /dt=100A/μs
Q _{rr} ¹	-	2.9	-	nC	

¹ Pulse test : Pulse width≤300μs, Duty cycle≤2%

² Independent of operating temperature

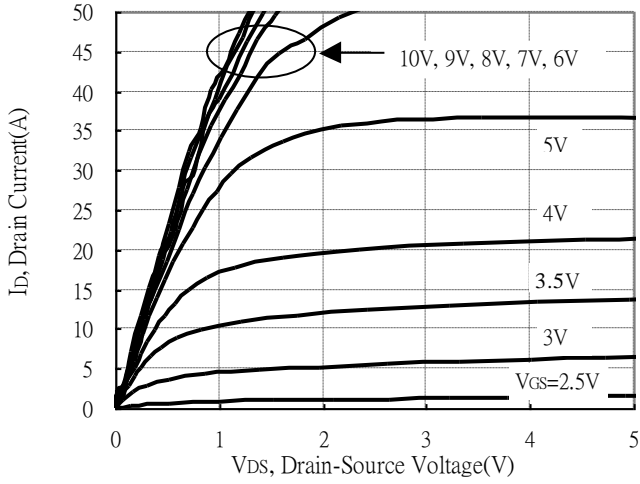
³ Pulse width limited by maximum junction temperature

Recommended Soldering Footprint

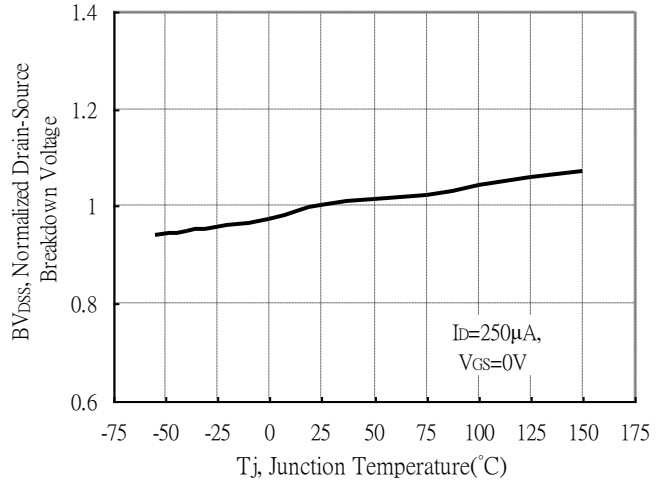


Typical Characteristics

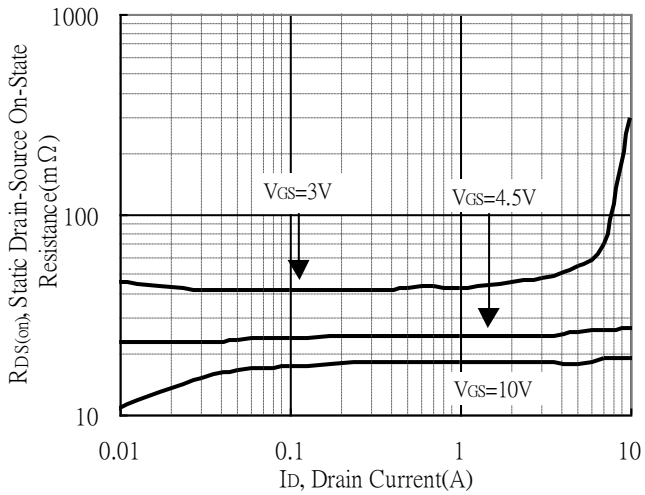
Typical Output Characteristics



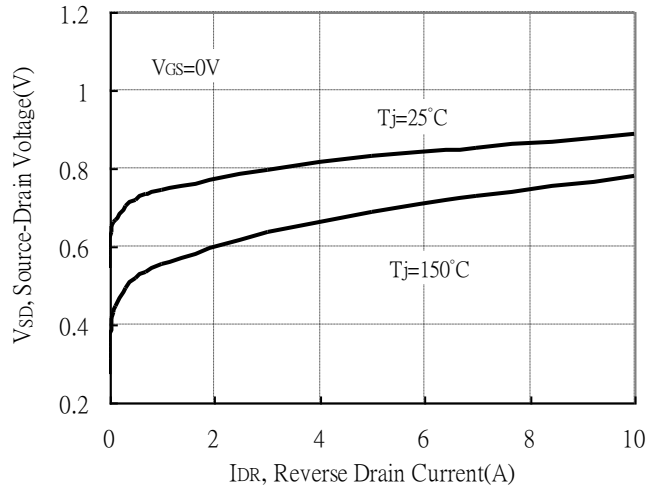
Brekdown Voltage vs Ambient Temperature



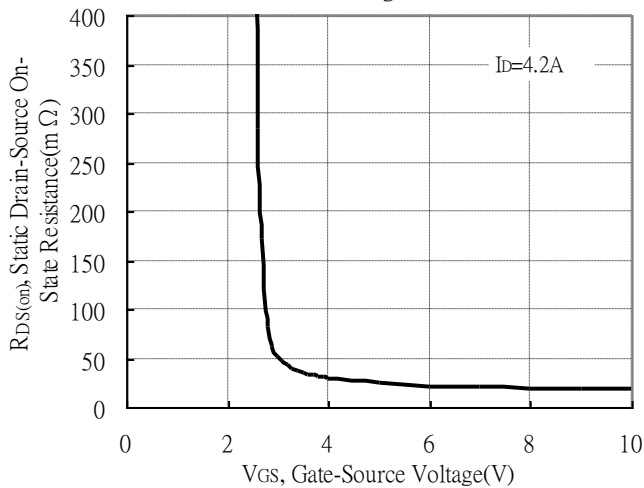
Static Drain-Source On-State resistance vs Drain Current



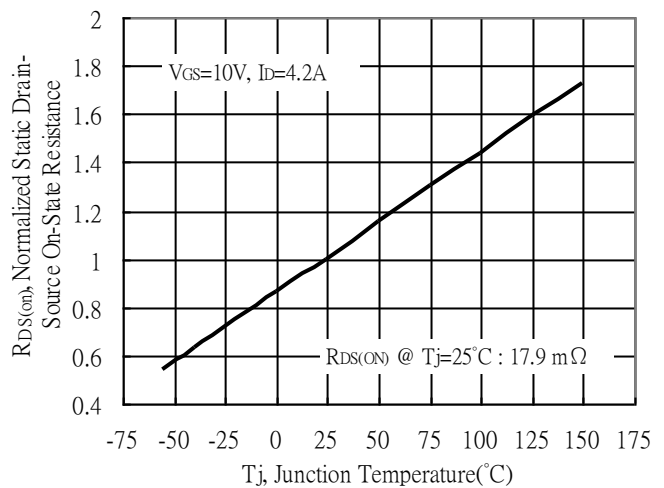
Reverse Drain Current vs Source-Drain Voltage



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

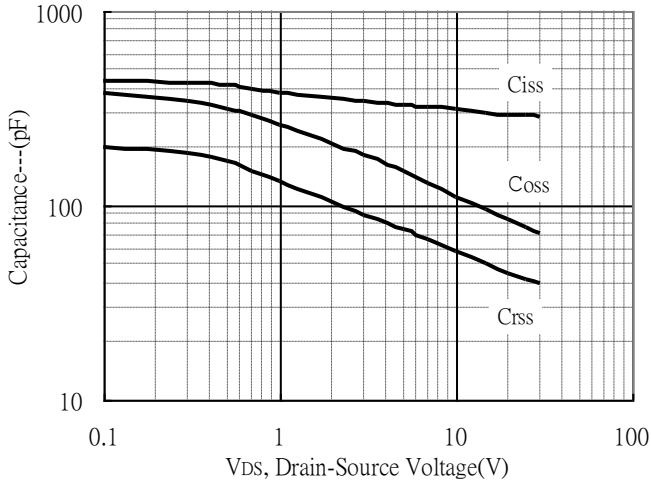


Drain-Source On-State Resistance vs Junction Temperature

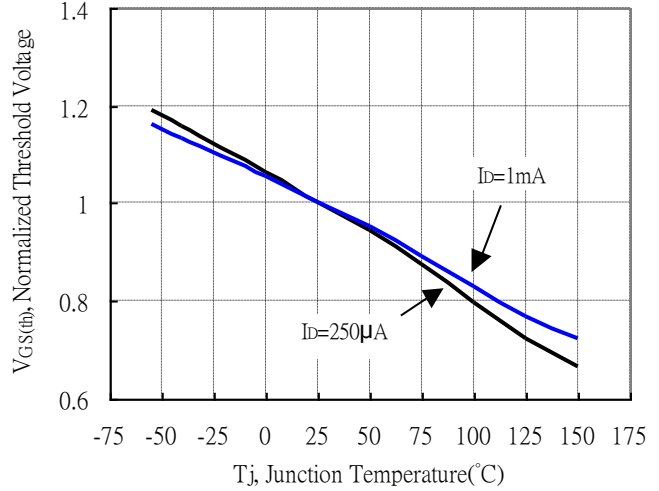


Typical Characteristics(Cont.)

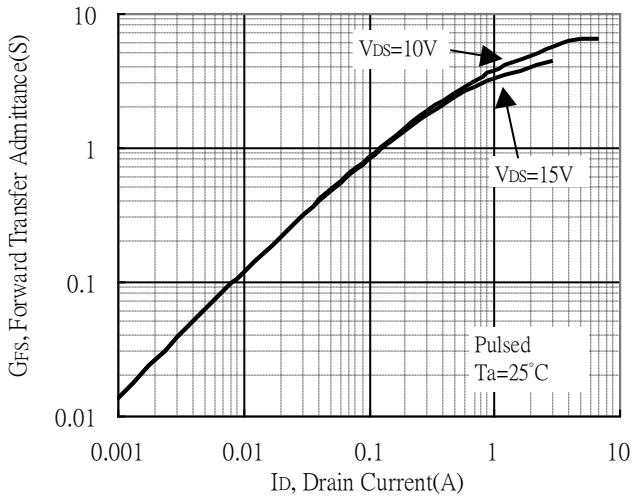
Capacitance vs Drain-to-Source Voltage



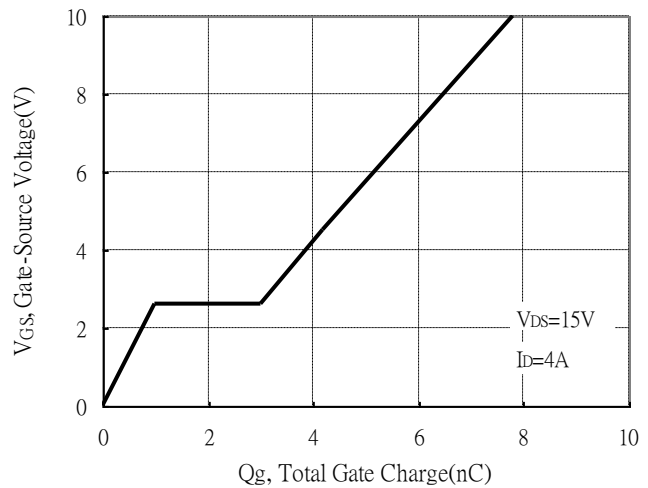
Threshold Voltage vs Junction Temperature



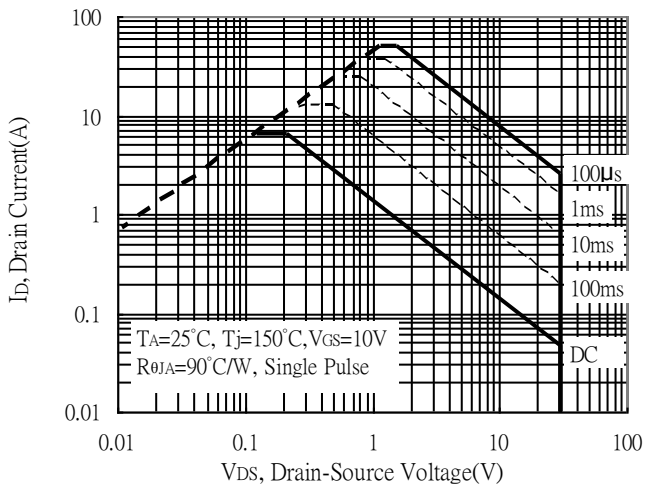
Forward Transfer Admittance vs Drain Current



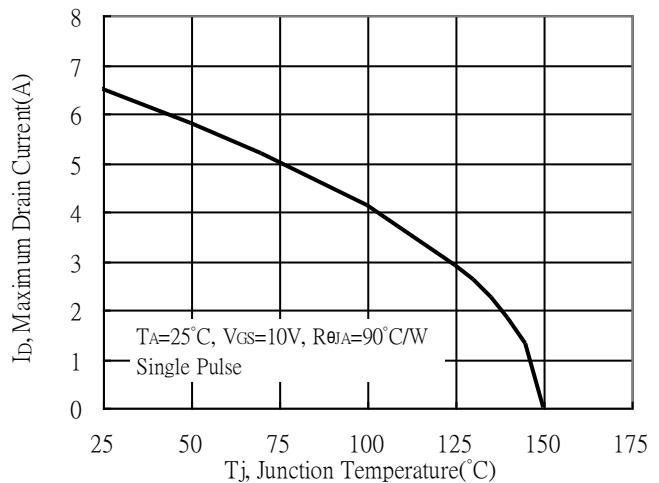
Gate Charge Characteristics



Maximum Safe Operating Area

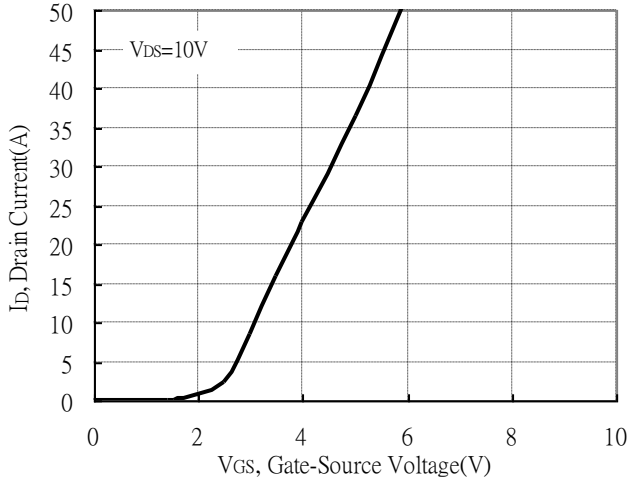


Maximum Drain Current vs Junction Temperature

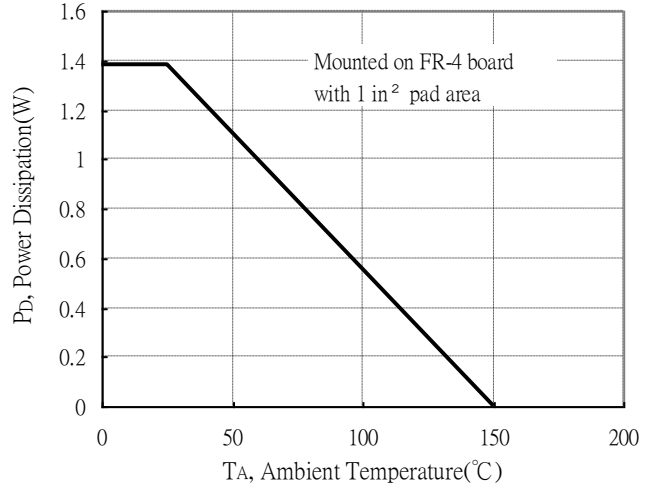


Typical Characteristics(Cont.)

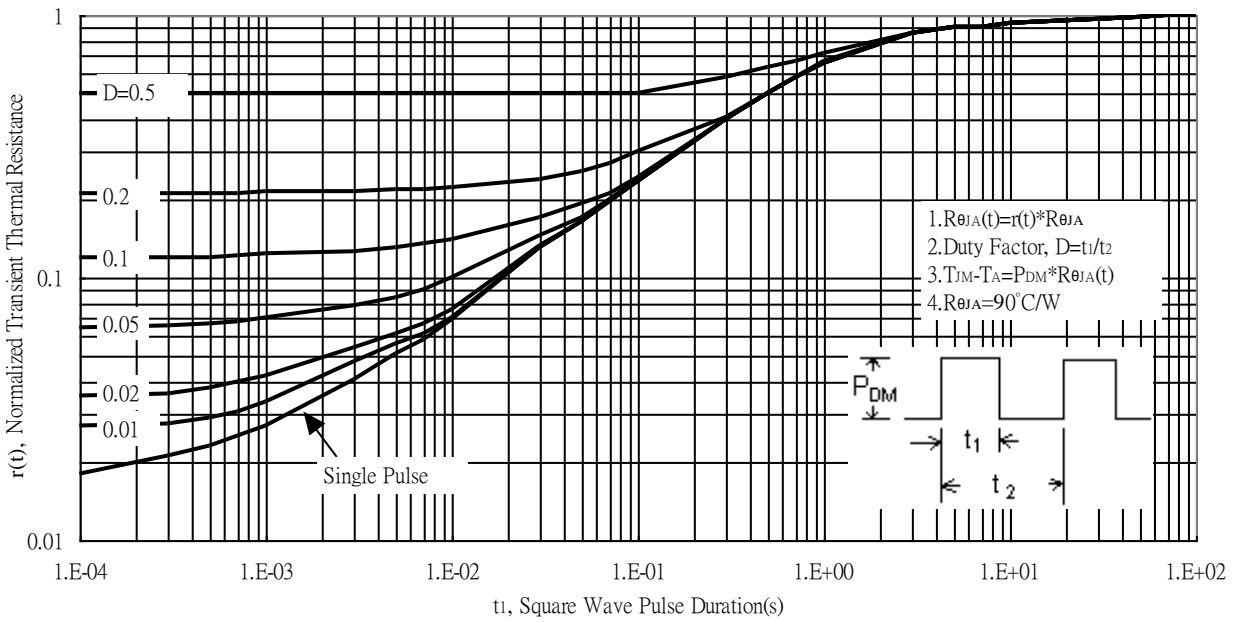
Typical Transfer Characteristics



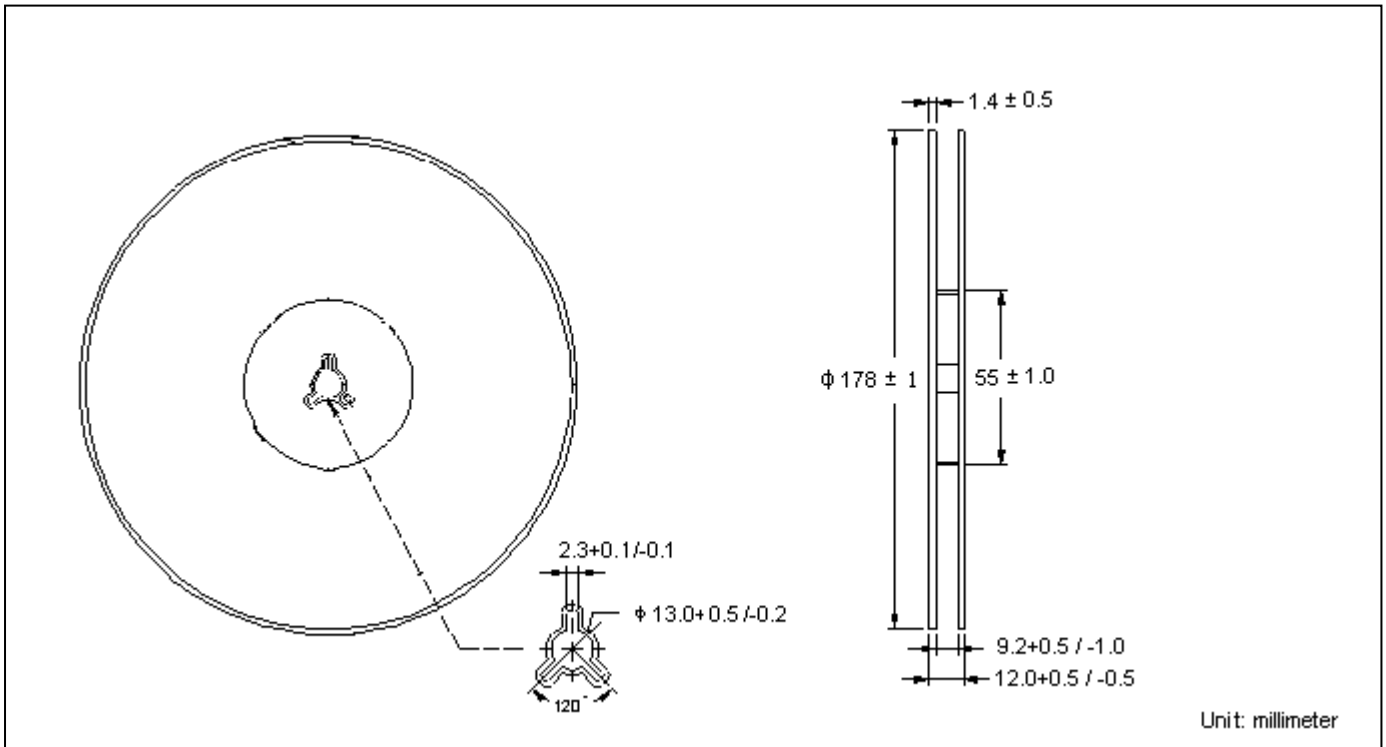
Power Derating Curve



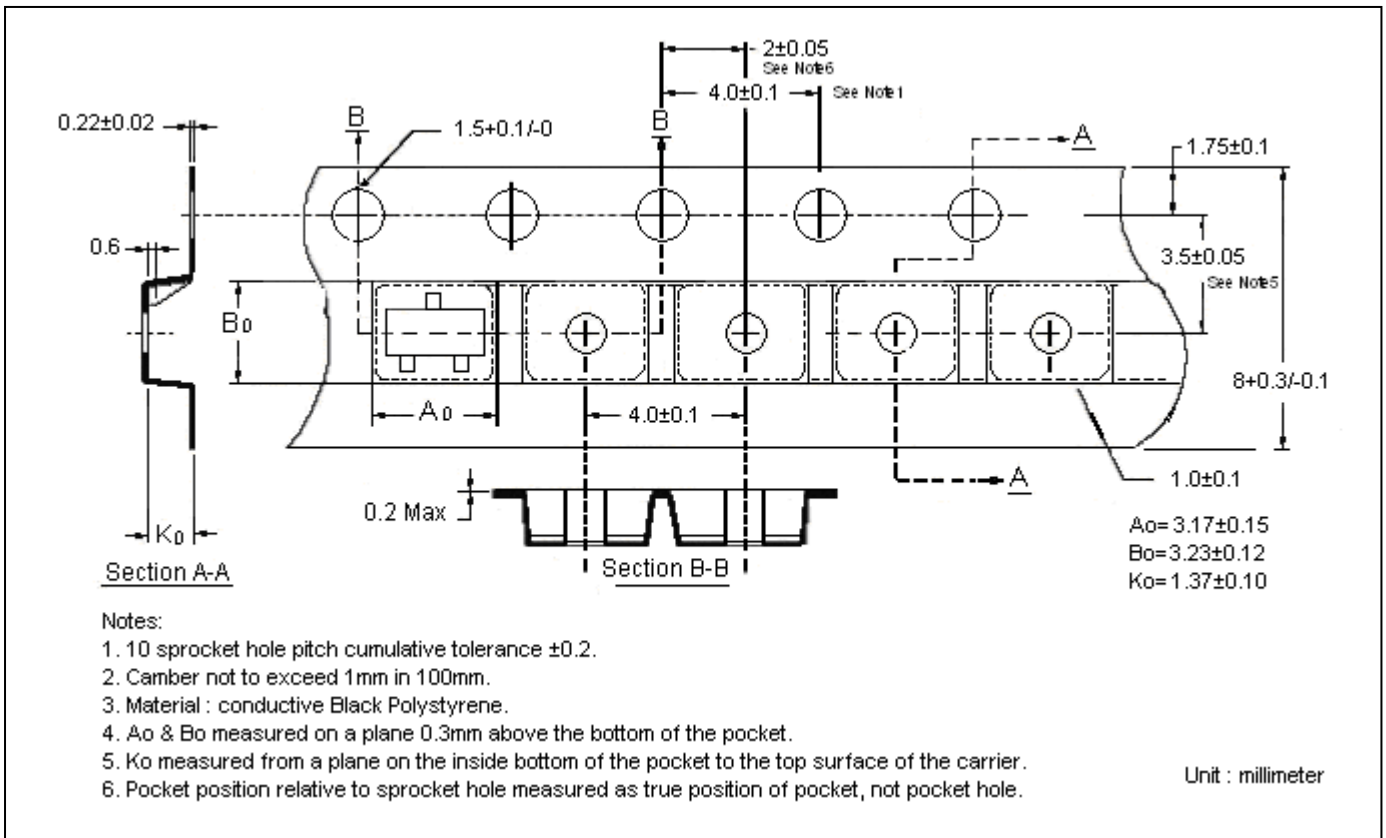
Transient Thermal Response Curves



Reel Dimension



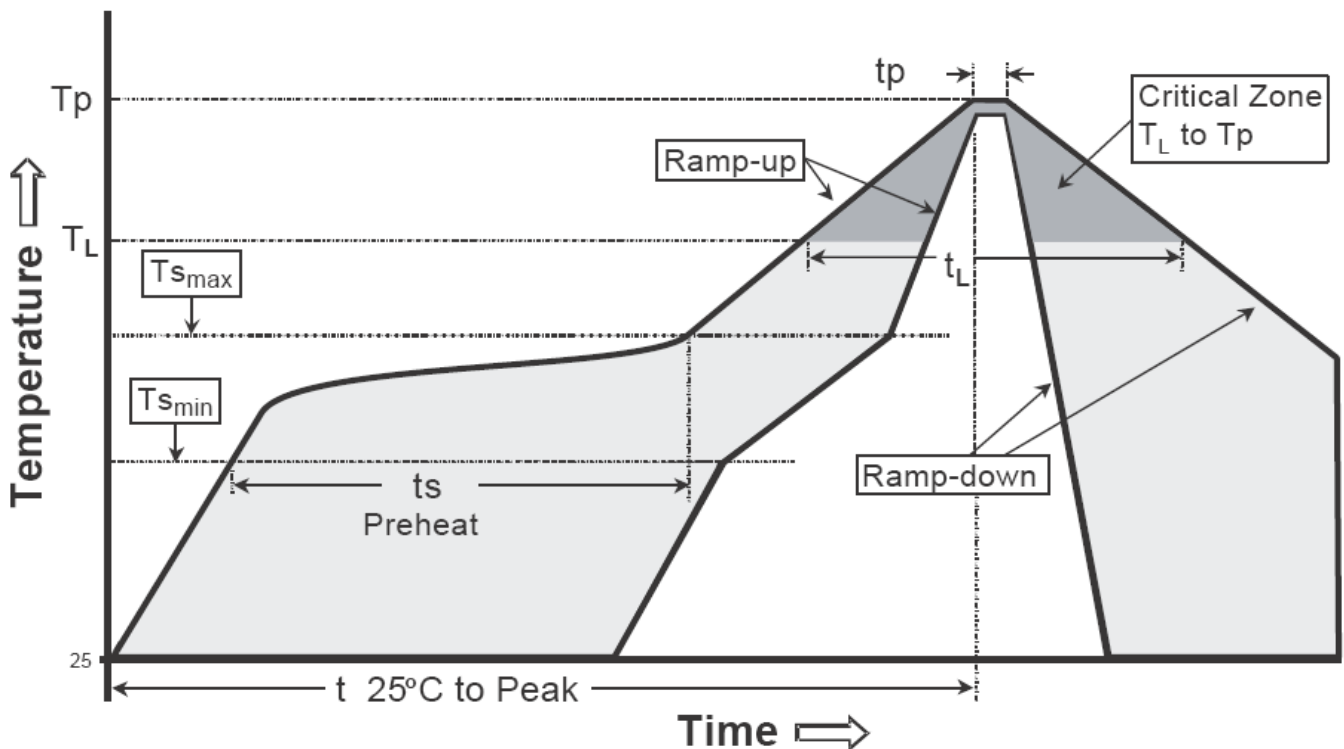
Carrier Tape Dimension



Recommended wave soldering condition

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

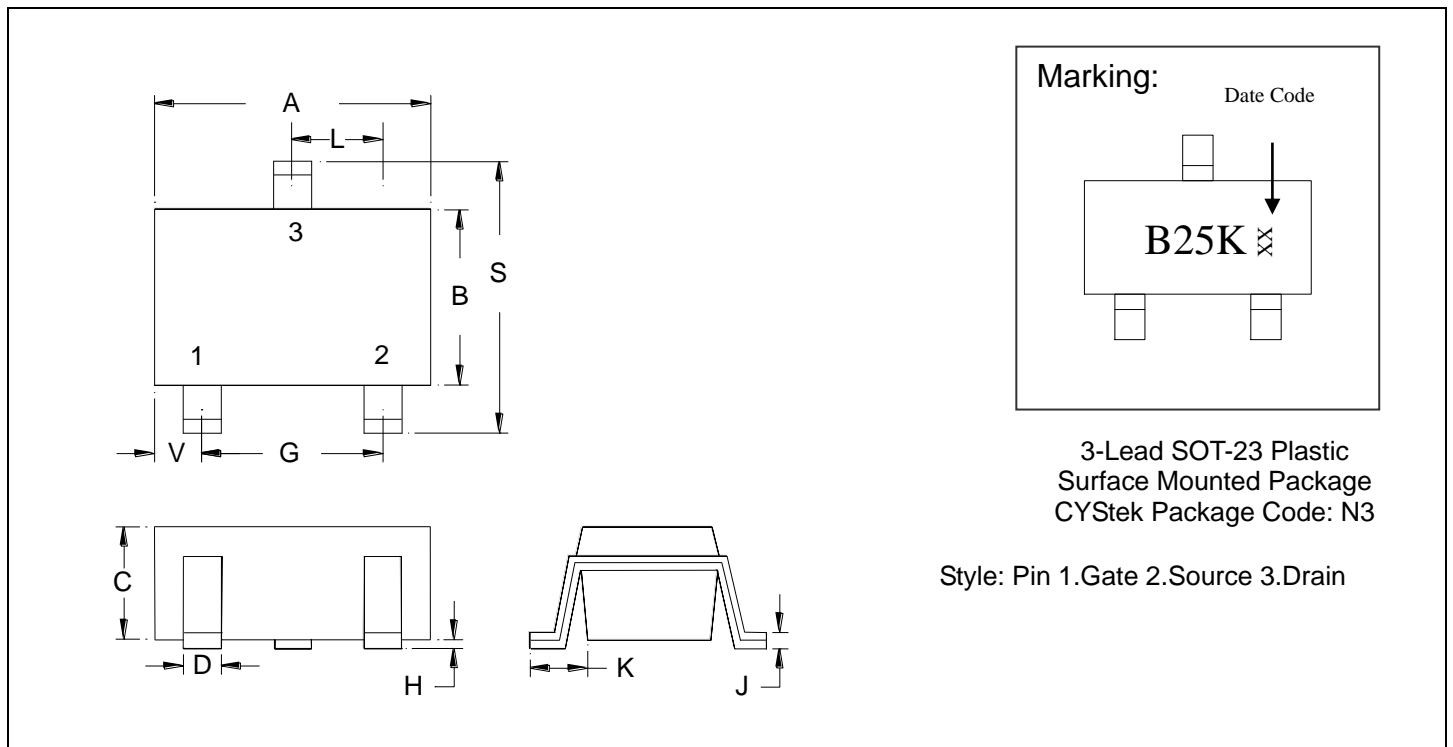
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	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-23 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1063	0.1220	2.70	3.10	J	0.0034	0.0079	0.085	0.20
B	0.0472	0.0630	1.20	1.60	K	0.0128	0.0266	0.32	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					

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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