

**600V N-Channel Enhancement Mode MOSFET**

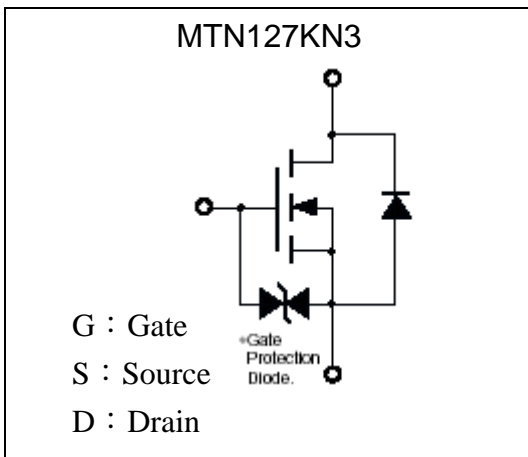
# MTN127KN3

$BV_{DSS}$	600V
$I_D @ V_{GS}=10V, T_A=25^\circ C$	33mA
$R_{DS(on)(TYP)} @ V_{GS}=10V, I_D=16mA$	165 $\Omega$
$R_{DS(on)(TYP)} @ V_{GS}=4.5V, I_D=16mA$	166 $\Omega$

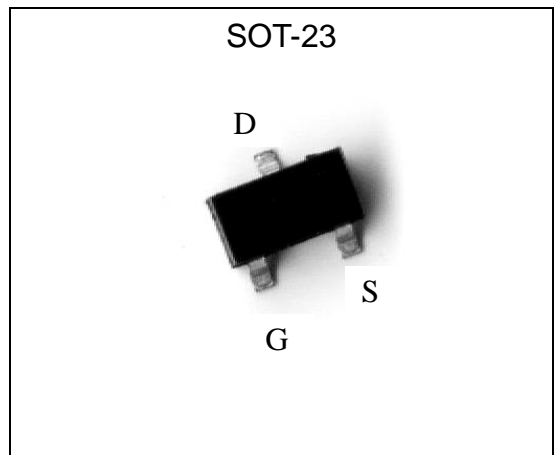
**Features**

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

**Equivalent Circuit**

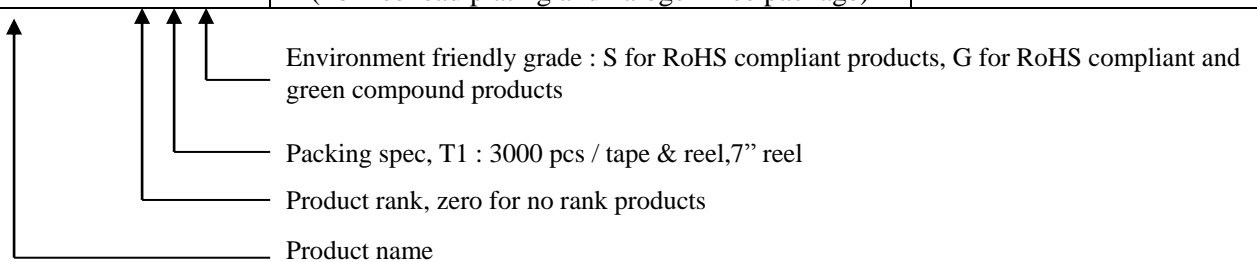


**Outline**



**Ordering Information**

Device	Package	Shipping
MTN127KN3-0-T1-G	SOT-23 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel





**Absolute Maximum Ratings** (Tc=25°C, unless otherwise noted)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V <sub>DS</sub>	600	V
Gate-Source Voltage	V <sub>GS</sub>	±20	
Continuous Drain Current	I <sub>D</sub>	T <sub>A</sub> =25°C, V <sub>GS</sub> =10V	33
		T <sub>A</sub> =70°C, V <sub>GS</sub> =10V	26
Pulsed Drain Current	I <sub>DM</sub>	132 (Note 1 & 2)	mA
Power Dissipation	P <sub>D</sub>	T <sub>A</sub> =25°C	
		T <sub>A</sub> =70°C	0.32 (Note 3)
Gate Source ESD susceptibility	V <sub>ESD(G-S)</sub>	3000 (Note 4)	V
Operating Junction and Storage Temperature	T <sub>j</sub> , T <sub>stg</sub>	-55 ~ +150	°C

**Thermal Characteristics**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction to Ambient, max	R <sub>θJA</sub>	250 *3	°C/W
Thermal Resistance, Junction to Case, max	R <sub>θJC</sub>	60	

- Note : 1. Pulse width limited by maximum junction temperature.  
 2. Duty cycle ≤ 1%.  
 3. Surface mounted on min. copper pad.  
 4. Human body model, 1.5kΩ in series with 100pF.

**Electrical Characteristics** (T<sub>A</sub>=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	600	-	-	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	1.5	-	3		V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA
I <sub>GSS</sub>	-	-	±10	μA	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V
I <sub>DSS</sub>	-	-	1		V <sub>DS</sub> =600V, V <sub>GS</sub> =0V
	-	-	10		V <sub>DS</sub> =600V, V <sub>GS</sub> =0V, T <sub>j</sub> =55°C
*R <sub>DS(ON)</sub> <sup>1</sup>	-	165	250	Ω	I <sub>D</sub> =16mA, V <sub>GS</sub> =10V
	-	166	260		I <sub>D</sub> =16mA, V <sub>GS</sub> =4.5V
*G <sub>FS</sub> <sup>1</sup>	-	57	-	mS	V <sub>DS</sub> =40V, I <sub>D</sub> =10mA
<b>Dynamic</b>					
C <sub>iss</sub>	-	21.4	32	pF	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz
C <sub>oss</sub>	-	2.7	4		
C <sub>rss</sub>	-	2.5	3.8		
*t <sub>d(ON)</sub> <sup>1 2</sup>	-	7.8	12	ns	V <sub>DS</sub> =300V, I <sub>D</sub> =10mA, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω
*t <sub>r</sub> <sup>1 2</sup>	-	22	33		
*t <sub>d(OFF)</sub> <sup>1 2</sup>	-	18.4	27.6		
*t <sub>f</sub> <sup>1 2</sup>	-	92.8	139.2		

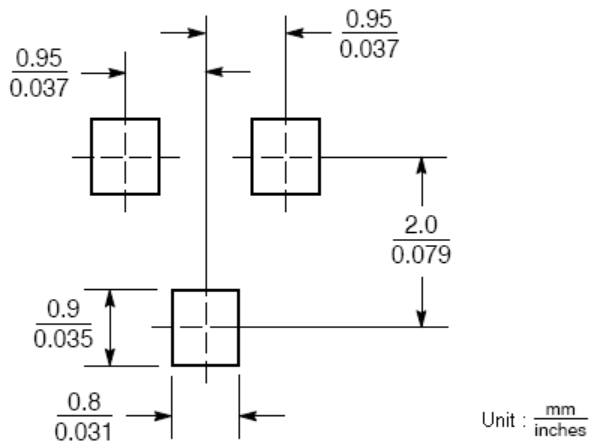
*Qg <sup>1 2</sup>	-	1.6	2.4	nC	V <sub>DS</sub> =300V, I <sub>D</sub> =10mA, V <sub>GS</sub> =10V
*Qgs <sup>1 2</sup>	-	0.5	0.8		
*Qgd <sup>1 2</sup>	-	0.6	0.9		
<b>Source-Drain Diode</b>					
I <sub>S</sub>	-	-	33	mA	
I <sub>SM</sub> <sup>3</sup>	-	-	132		
V <sub>SD</sub> <sup>1</sup>	-	0.75	1	V	I <sub>S</sub> =16mA, V <sub>GS</sub> =0V
trr <sup>1</sup>	-	210	315	ns	I <sub>F</sub> =16mA, dI <sub>F</sub> /dt=100A/μs
Qrr <sup>1</sup>	-	20	30	nC	

<sup>1</sup> Pulse test : Pulse width≤300μs, Duty cycle≤2%

<sup>2</sup> Independent of operating temperature

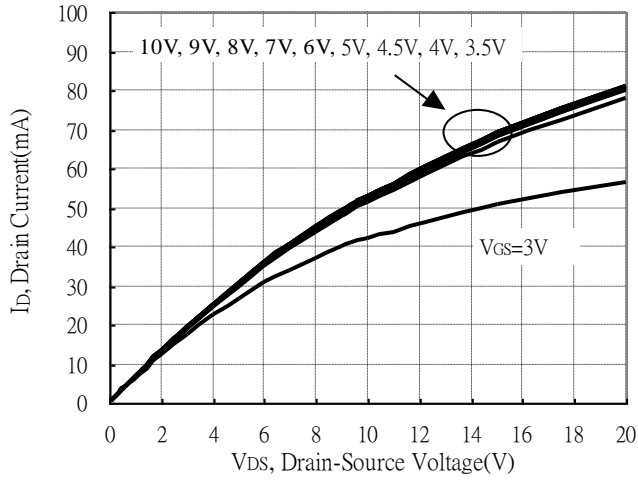
<sup>3</sup> Pulse width limited by maximum junction temperature

### Recommended Soldering Footprint

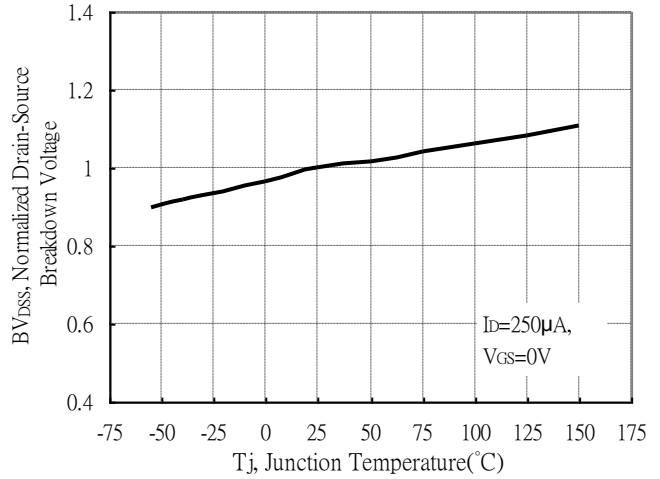


## Typical Characteristics

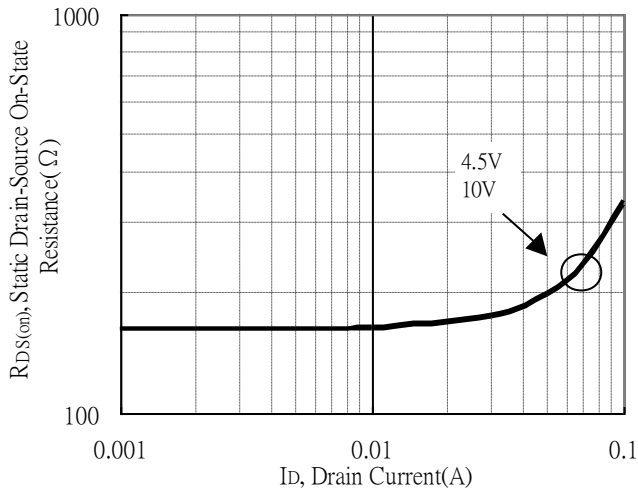
Typical Output Characteristics



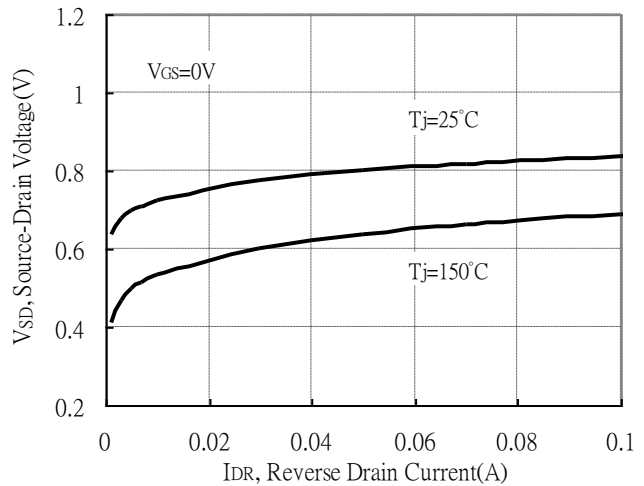
Breakdown Voltage vs Ambient Temperature



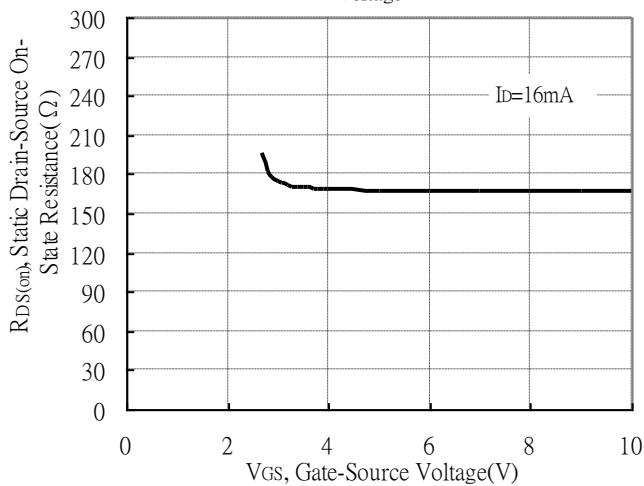
Static Drain-Source On-State resistance vs Drain Current



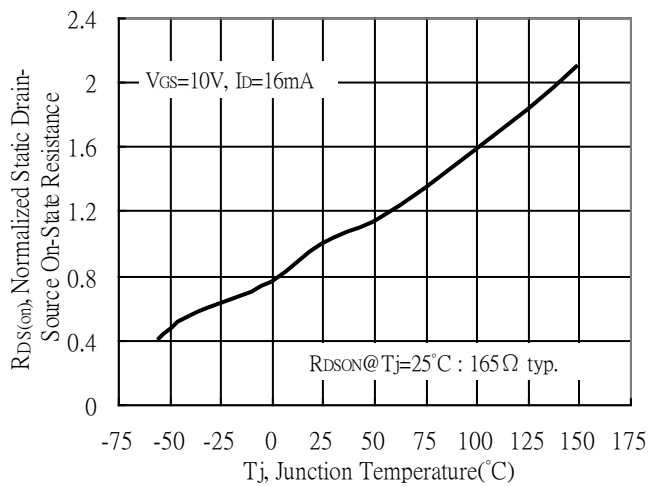
Reverse Drain Current vs Source-Drain Voltage



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

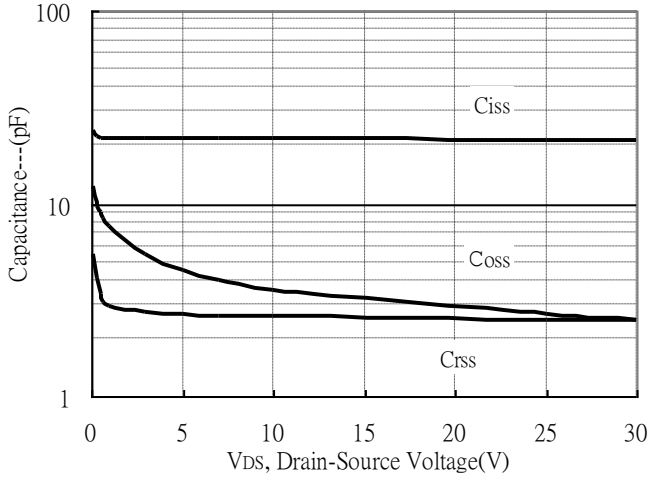


Drain-Source On-State Resistance vs Junction Temperature

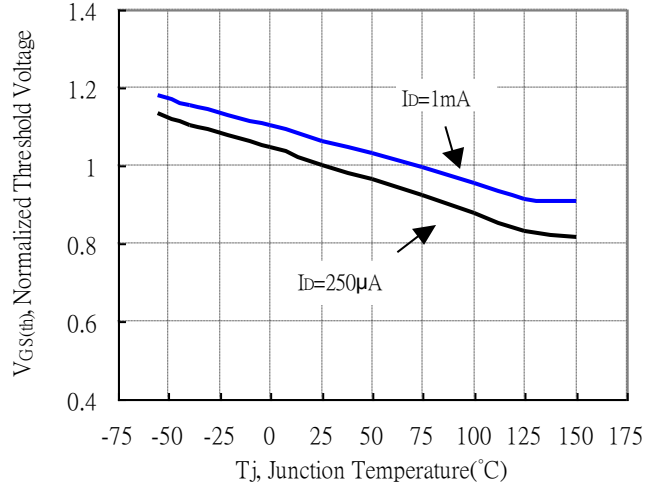


**Typical Characteristics(Cont.)**

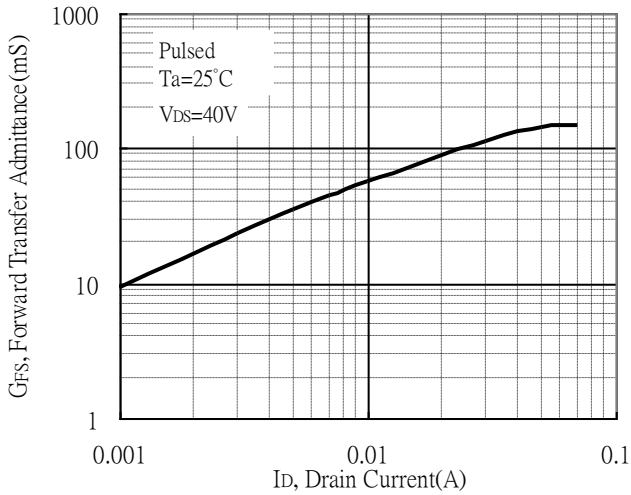
Capacitance vs Drain-to-Source Voltage



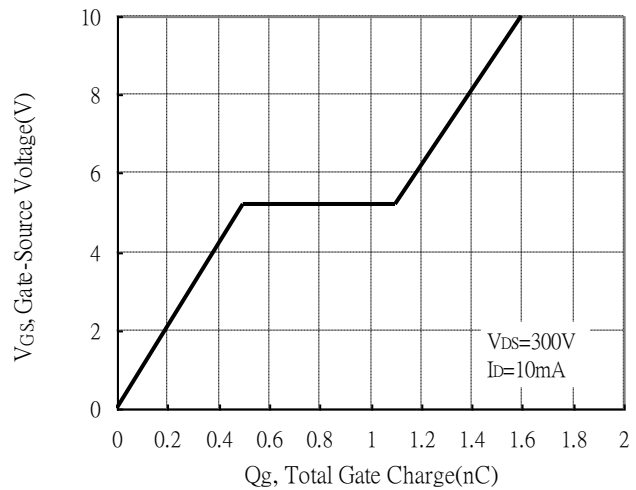
Threshold Voltage vs Junction Temperature



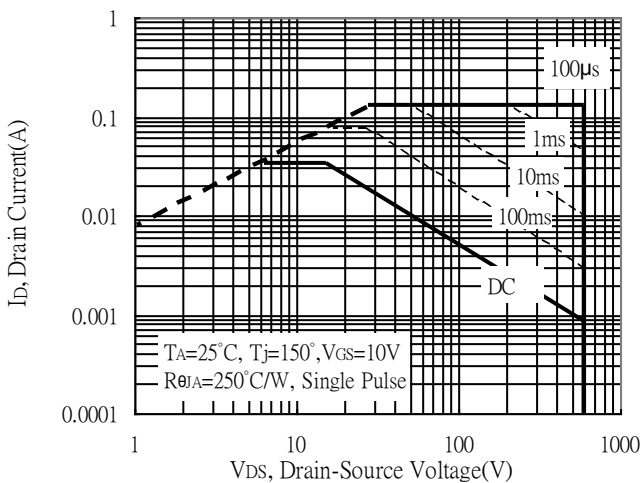
Forward Transfer Admittance vs Drain Current



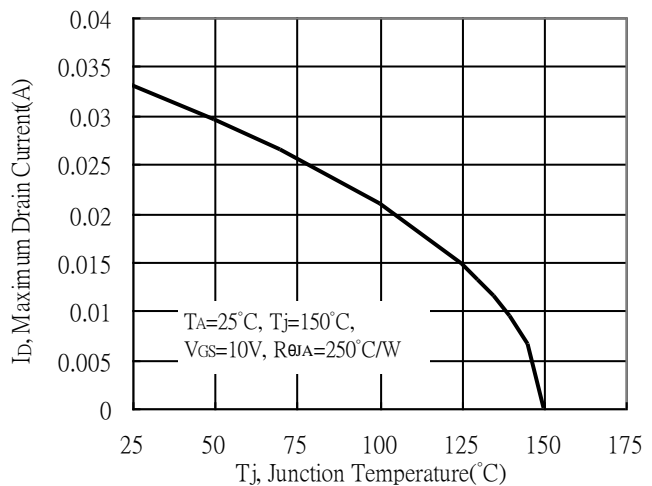
Gate Charge Characteristics



Maximum Safe Operating Area

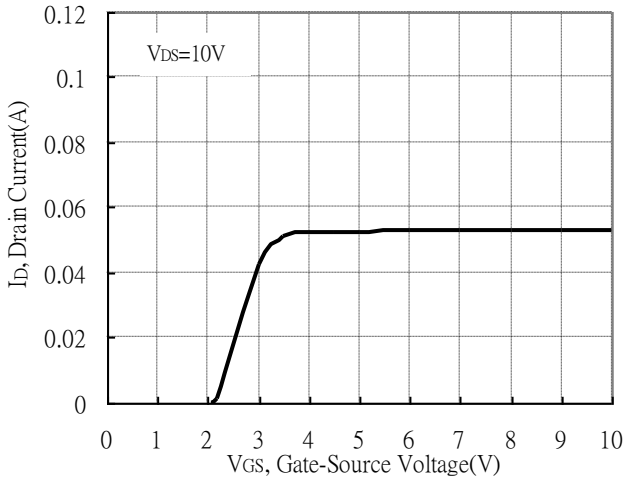


Maximum Drain Current vs Junction Temperature

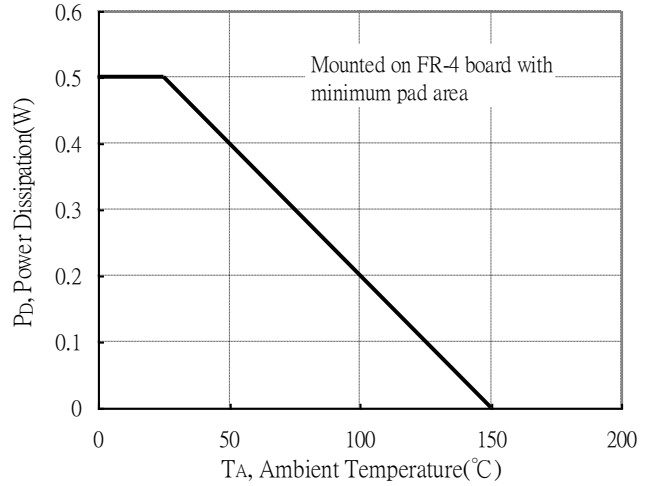


**Typical Characteristics(Cont.)**

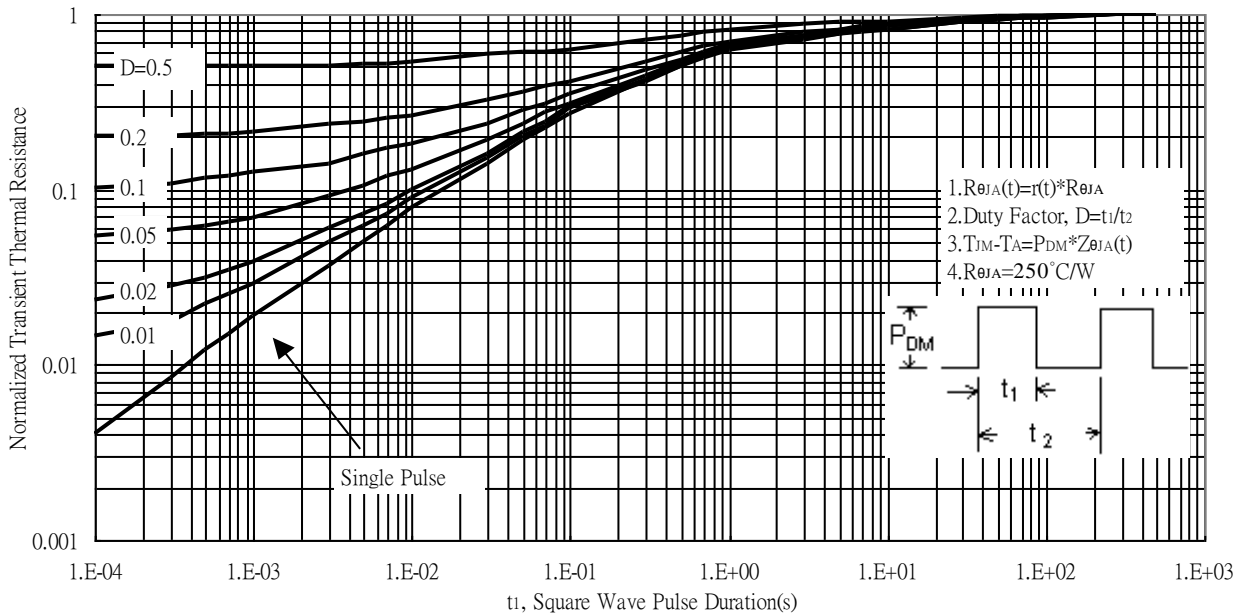
Typical Transfer Characteristics



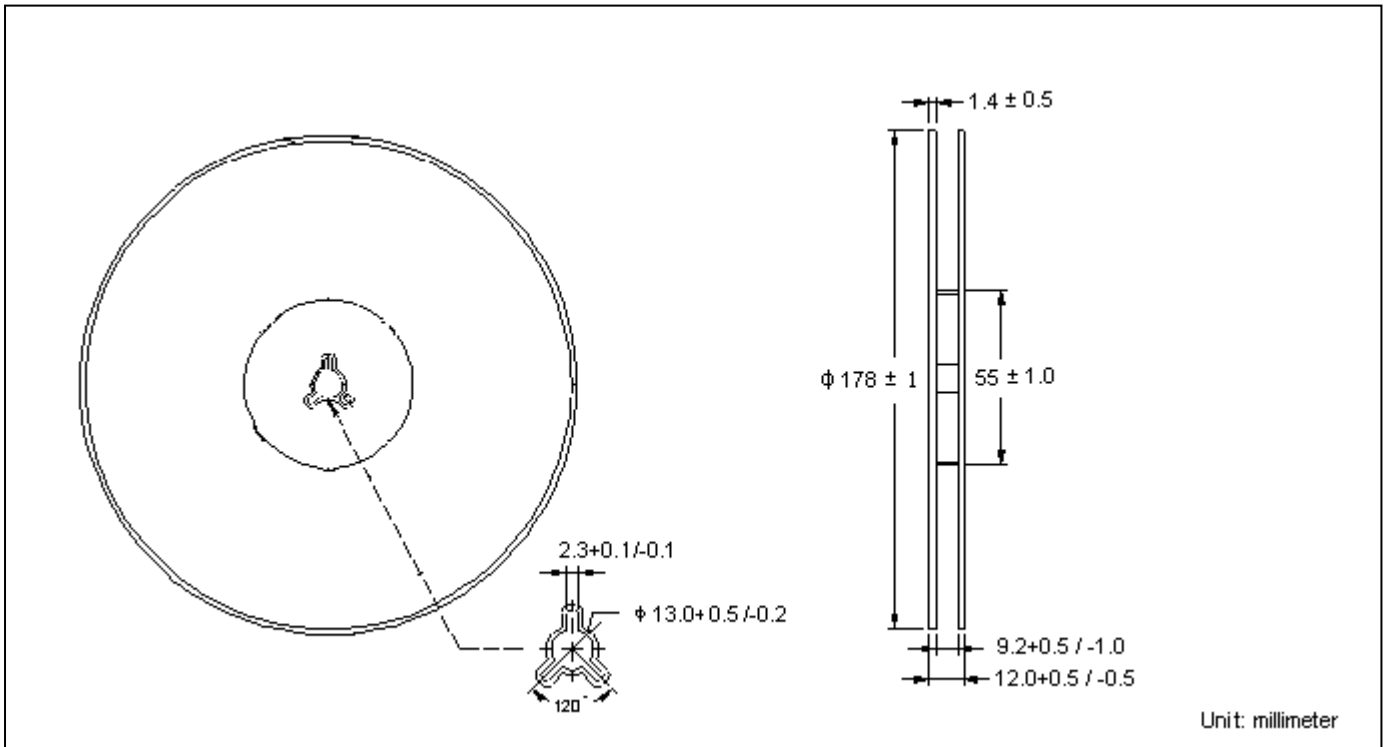
Power Derating Curve



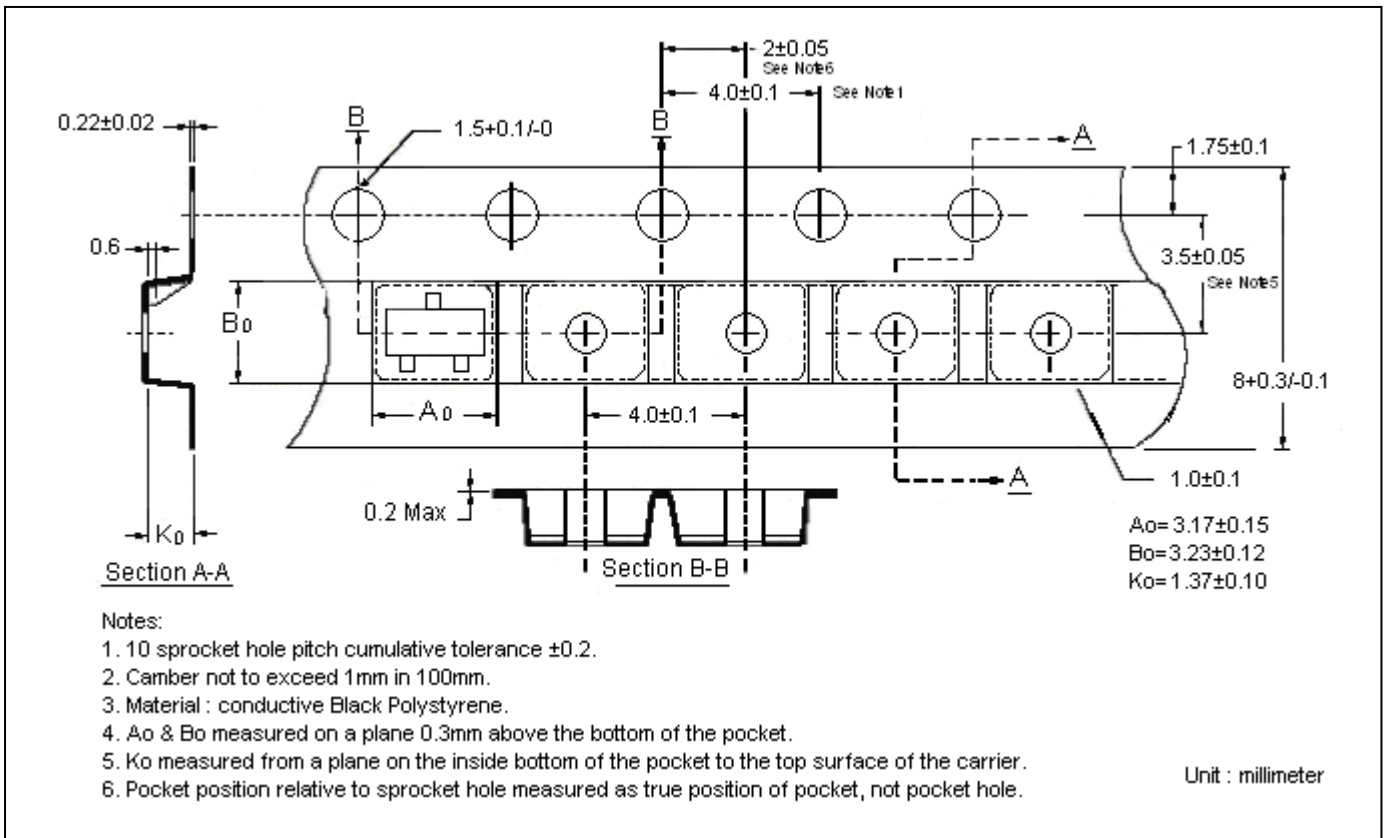
Transient Thermal Response Curves



**Reel Dimension**



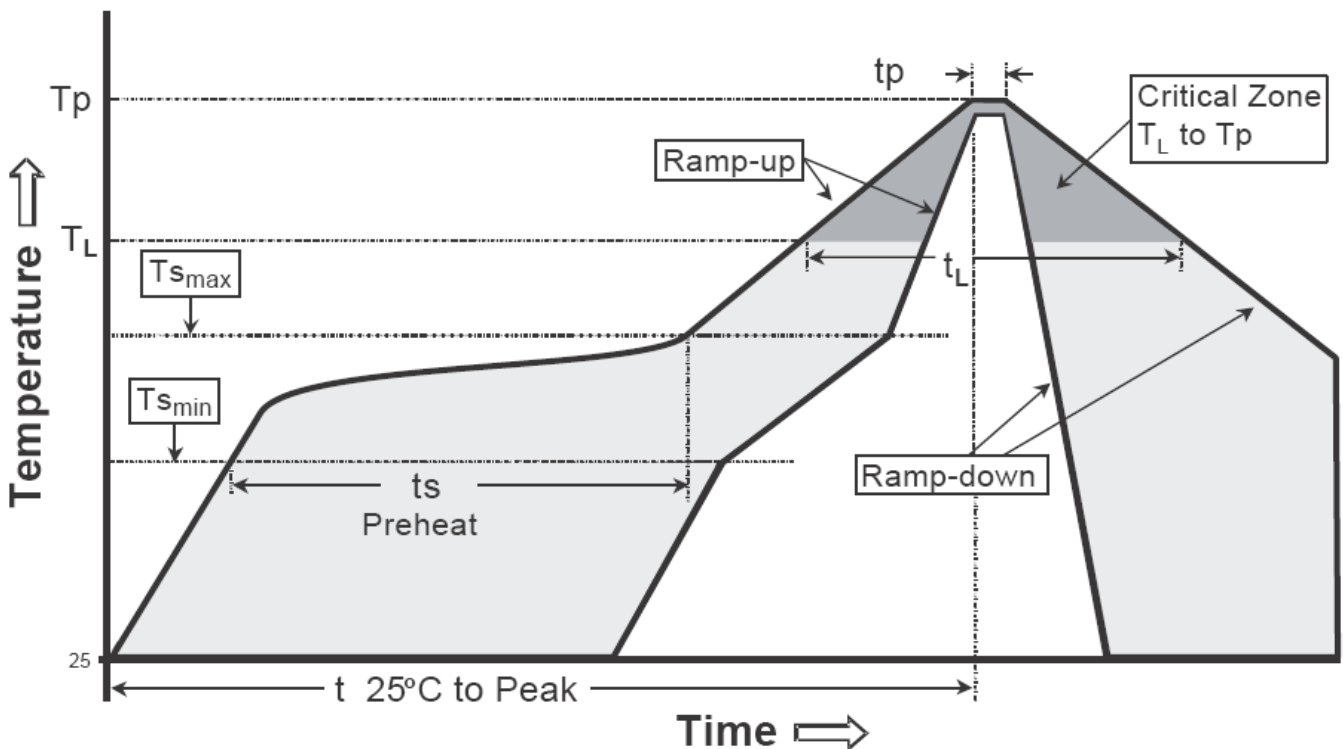
**Carrier Tape Dimension**



**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**

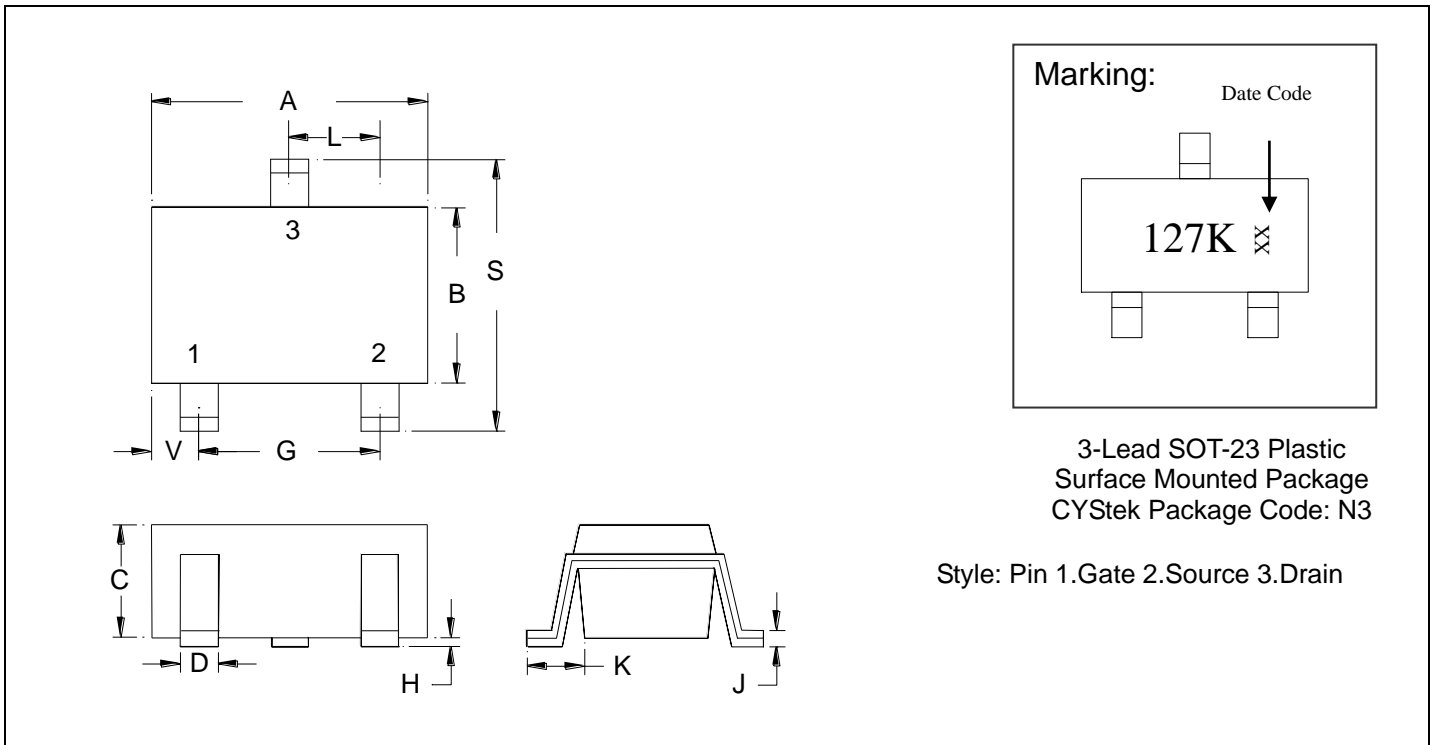


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T <sub>smax</sub> to T <sub>p</sub> )	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T <sub>s min</sub> )	100°C	150°C
-Temperature Max(T <sub>s max</sub> )	150°C	200°C
-Time(t <sub>s min</sub> to t <sub>s max</sub> )	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T <sub>L</sub> )	183°C	217°C
- Time (t <sub>L</sub> )	60-150 seconds	60-150 seconds
Peak Temperature(T <sub>P</sub> )	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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