

N-Channel Enhancement Mode Power MOSFET

MTN1N60BL3

BV_{DSS}	600V
I_D@V_{GS}=10V, T_A=25°C	0.4A
I_D@V_{GS}=10V, T_C=25°C	0.9A
R_{DS(on)}@V_{GS}=10V, I_D=0.2A	7.4Ω (typ)

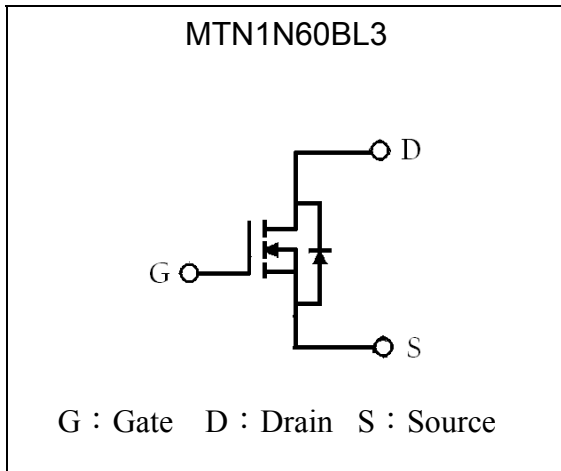
Description

The MTN1N60BL3 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The SOT-223 package is universally preferred for all commercial-industrial surface mount applications.

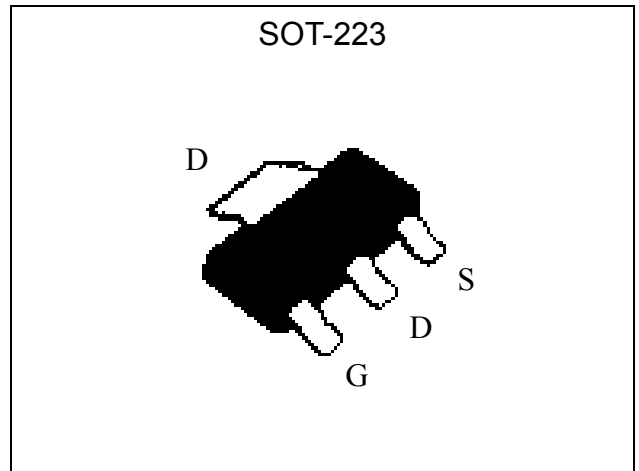
Features

- Single Drive Requirement
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free package

Symbol

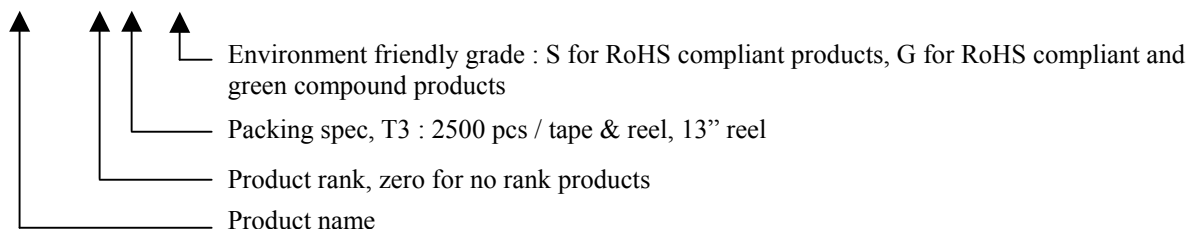


Outline



Ordering Information

Device	Package	Shipping
MTN1N60BL3-0-T3-G	SOT-223 (Pb-free lead plating and halogen-free package)	2500 pcs / tape & reel





Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit	
Drain-Source Voltage	V _{DS}	600	V	
Gate-Source Voltage	V _{GS}	±30		
Continuous Drain Current @V _{GS} =10V, T _C =25°C	I _D	0.9	A	
Continuous Drain Current @V _{GS} =10V, T _C =100°C		0.57		
Continuous Drain Current @V _{GS} =10V, T _A =25°C		0.4		
Continuous Drain Current @V _{GS} =10V, T _A =100°C		0.25		
Pulsed Drain Current	I _{DM}	1.6 *1		
Single Pulse Avalanche Current	I _{AS}	1		
Single Pulse Avalanche Energy @L=10mH, I _D =1A, V _{DD} =50V	E _{AS}	5 *2	mJ	
Total Power Dissipation	P _D	T _C =25°C	15	W
		T _C =100°C	6	
		T _A =25°C	3.1	
		T _A =100°C	1.2	
Operating Junction and Storage Temperature Range	T _j , T _{stg}	-55~+150	°C	

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{θJC}	8.2	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{θJA}	40 *3	

- Note : 1. Pulse width limited by maximum junction temperature.
 2. Guaranteed by design, not by 100% tested.
 3. Surface mounted on 1 in² copper pad of FR-4 board, 120°C/W when mounted on minimum copper pad.

Characteristics (Tc=25°C, unless otherwise specified)

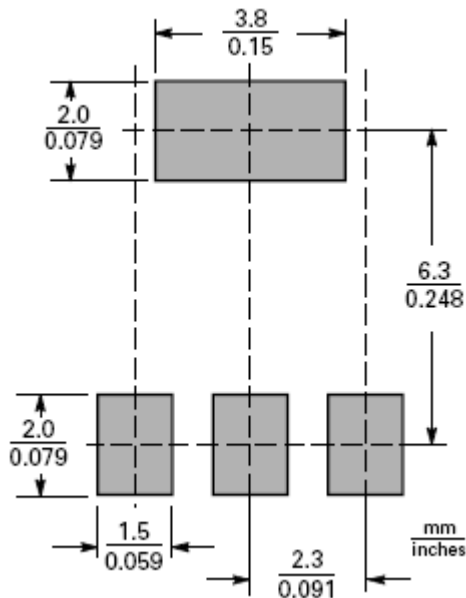
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	600	-	-	V	V _{GS} =0V, I _D =250μA
ΔBV _{DSS} /ΔT _j	-	0.6	-	V/°C	Reference to 25°C, I _D =250μA
V _{GS(th)}	2.0	-	4.0	V	V _{DS} = V _{GS} , I _D =250μA
G _{FS} *1	-	6.8	-	S	V _{DS} =15V, I _D =0.2A
I _{GSS}	-	-	±100	nA	V _{GS} =±30V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =600V, V _{GS} =0V
	-	-	10		V _{DS} =480V, V _{GS} =0V, T _j =125°C
R _{DS(ON)} *1	-	7.4	9.5	Ω	V _{GS} =10V, I _D =0.2A
Dynamic					
C _{iss}	-	135	-	pF	V _{GS} =0V, V _{DS} =25V, f=1MHz
C _{oss}	-	24.3	-		
C _{rss}	-	10.7	-		

Characteristics (Tc=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Qg *1,2	-	5	-	nC	V _{DS} =480V, V _{GS} =10V, I _D =1A
Qgs *1,2	-	2.4	-		
Qgd *1,2	-	0.9	-		
t _{d(ON)} *1,2	-	5.6	-	ns	V _{DS} =300V, I _D =1A, V _{GS} =10V, R _{GS} =25Ω
t _r *1,2	-	7.8	-		
t _{d(OFF)} *1,2	-	11.6	-		
t _f *1,2	-	12.6	-		
Source-Drain Diode					
I _S *1	-	-	0.4	A	
I _{SM} *3	-	-	1.6		
V _{SD} *1	-	0.67	1.5	V	I _S =0.4A, V _{GS} =0V
t _{rr}	-	190	-	ns	I _F =1A, dI _F /dt=100A/μs
Q _{rr}	-	340	-	nC	

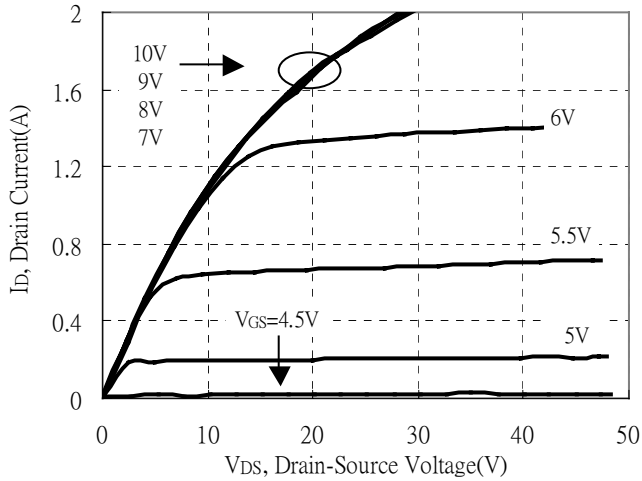
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
 *2.Independent of operating temperature
 *3.Pulse width limited by maximum junction temperature.

Recommended soldering footprint

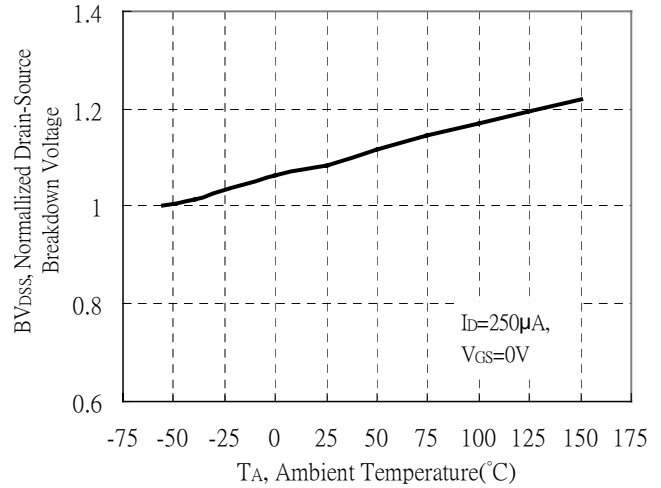


Typical Characteristics

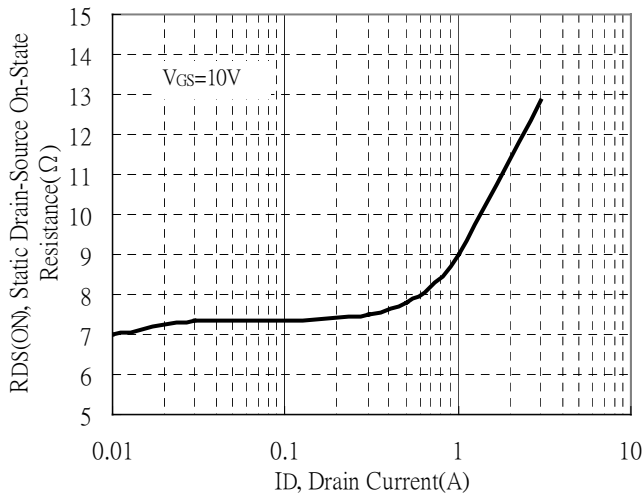
Typical Output Characteristics



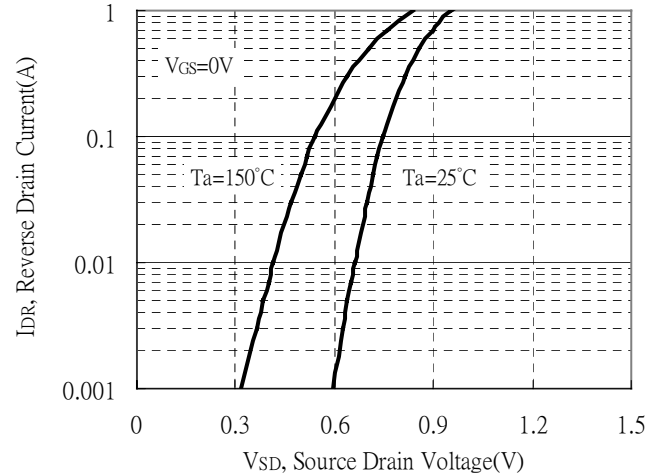
Breakdown Voltage vs Ambient Temperature



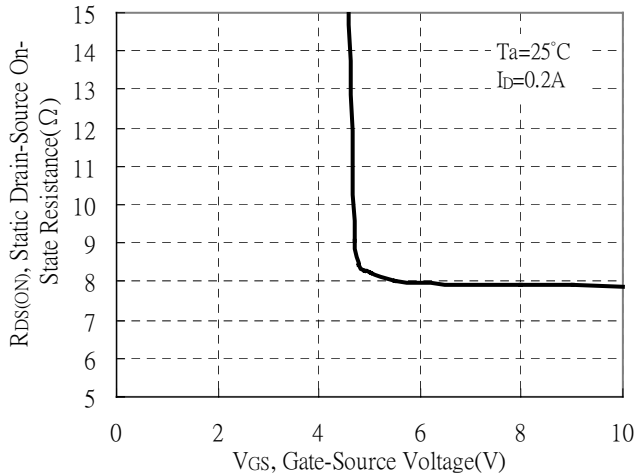
Static Drain-Source On-State resistance vs Drain Current



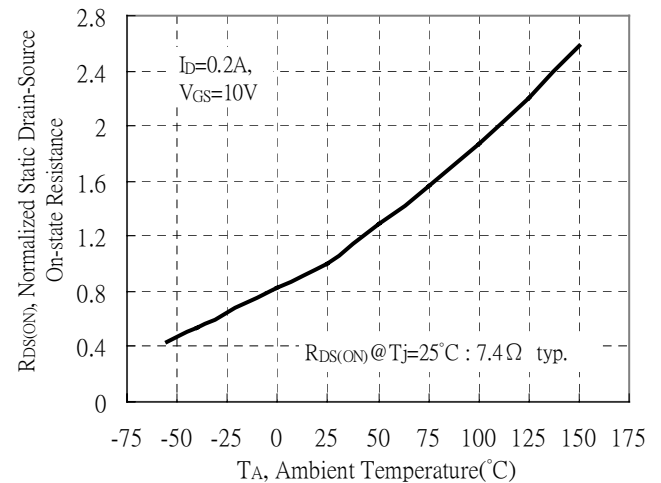
Body Diode Forward Voltage Variation vs Source Current and Temperature



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



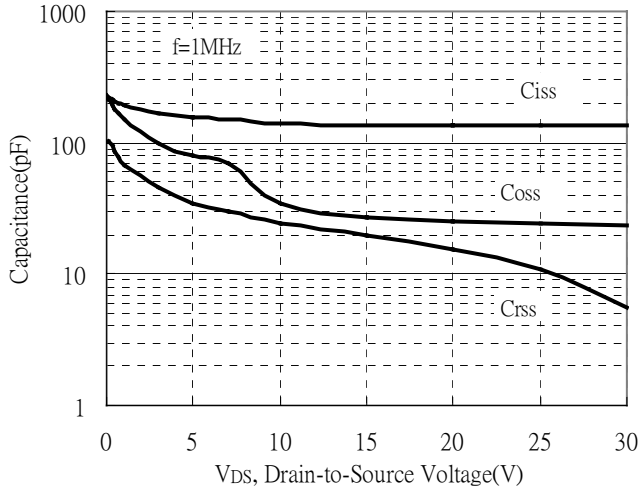
Static Drain-Source On-resistance vs Ambient Temperature



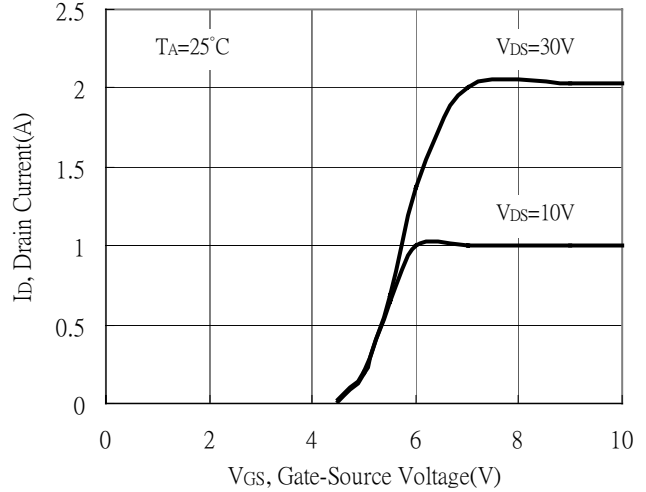


Typical Characteristics(Cont.)

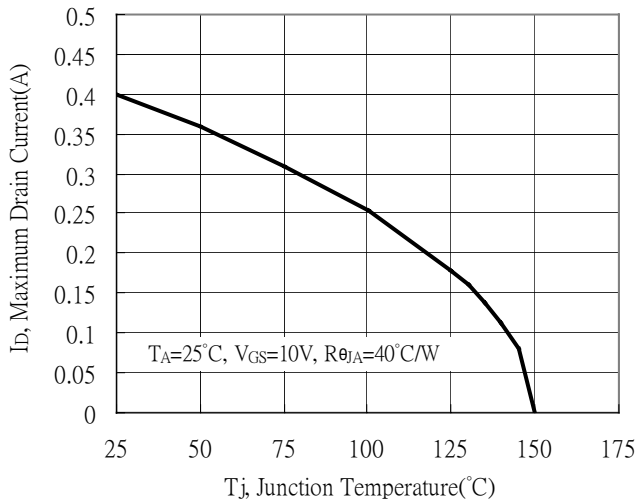
Capacitance vs Reverse Voltage



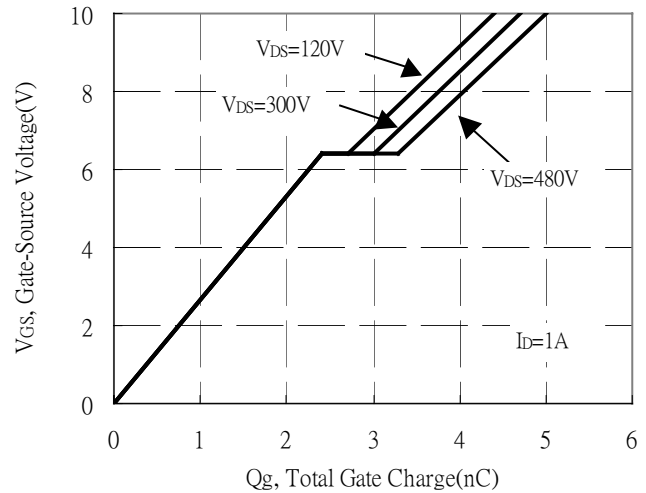
Drain Current vs Gate-Source Voltage



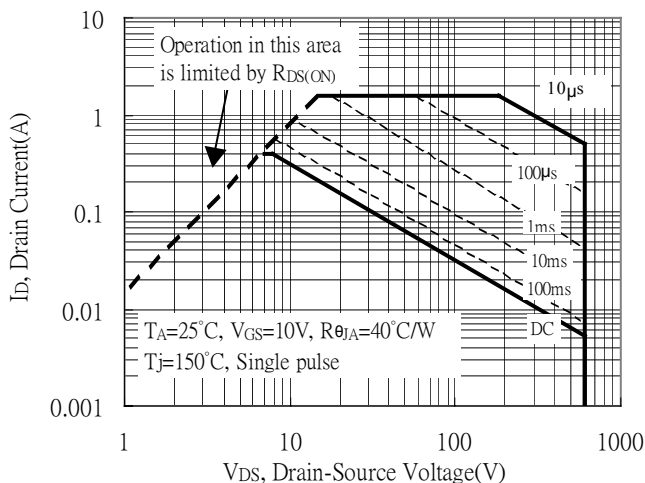
Maximum Drain Current vs Junction Temperature



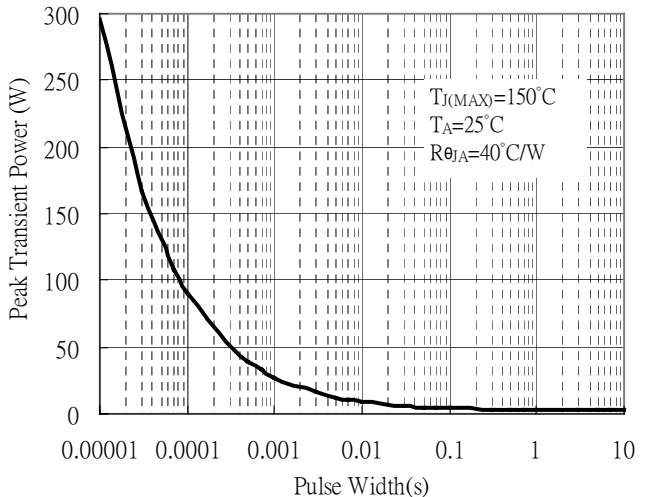
Gate Charge Characteristics



Maximum Safe Operating Area

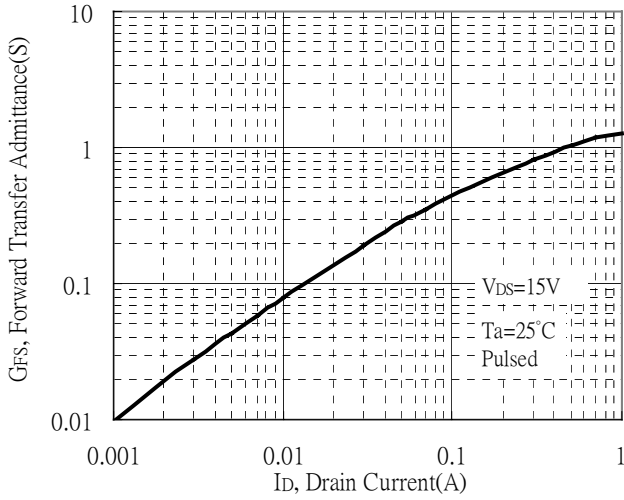


Single Pulse Maximum Power Dissipation

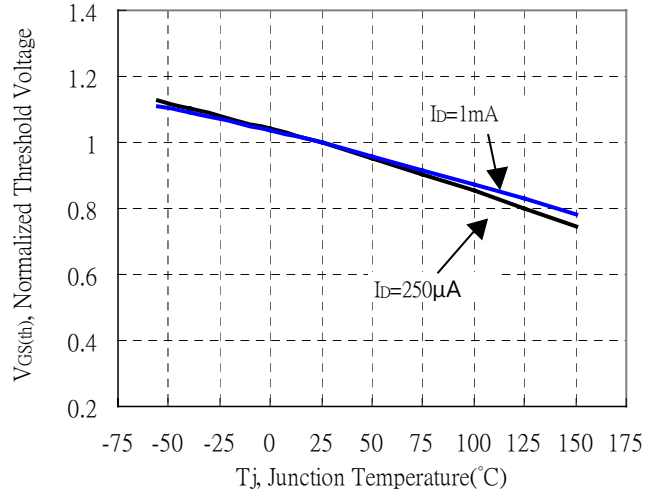


Typical Characteristics(Cont.)

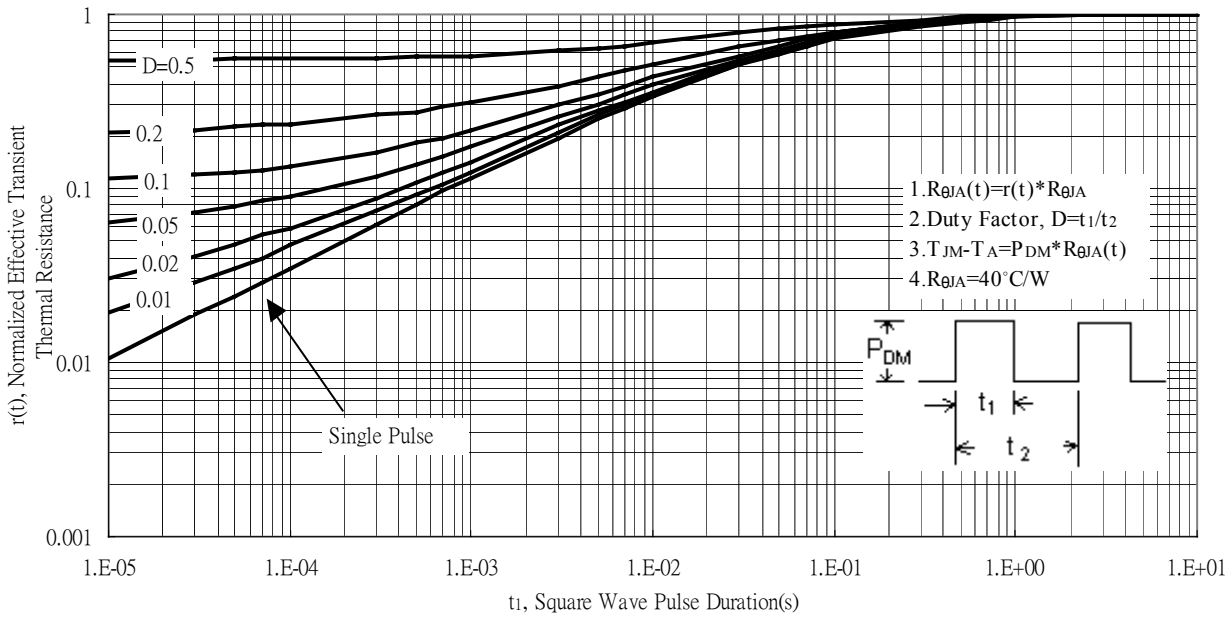
Forward Transfer Admittance vs Drain Current



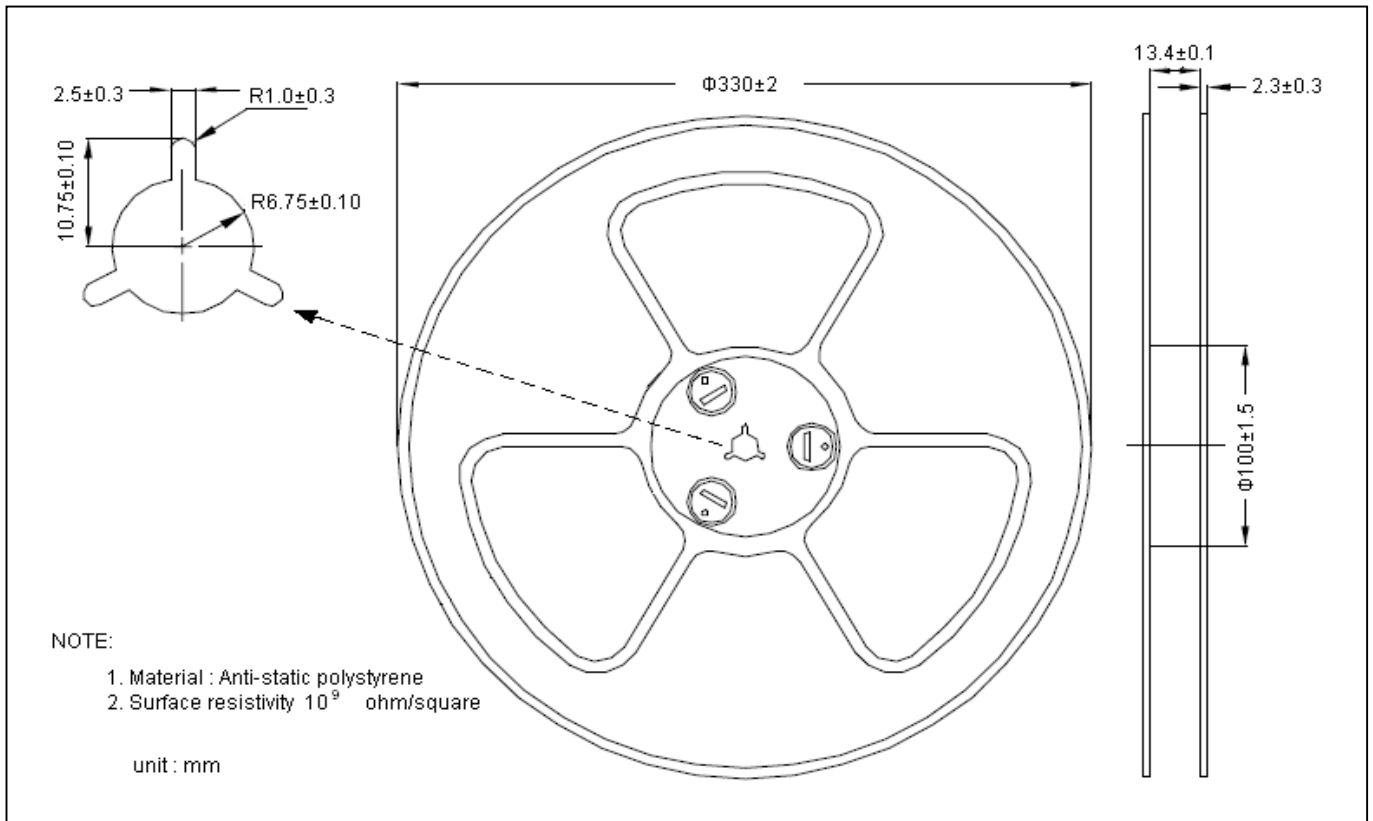
Threshold Voltage vs Junction Temperature



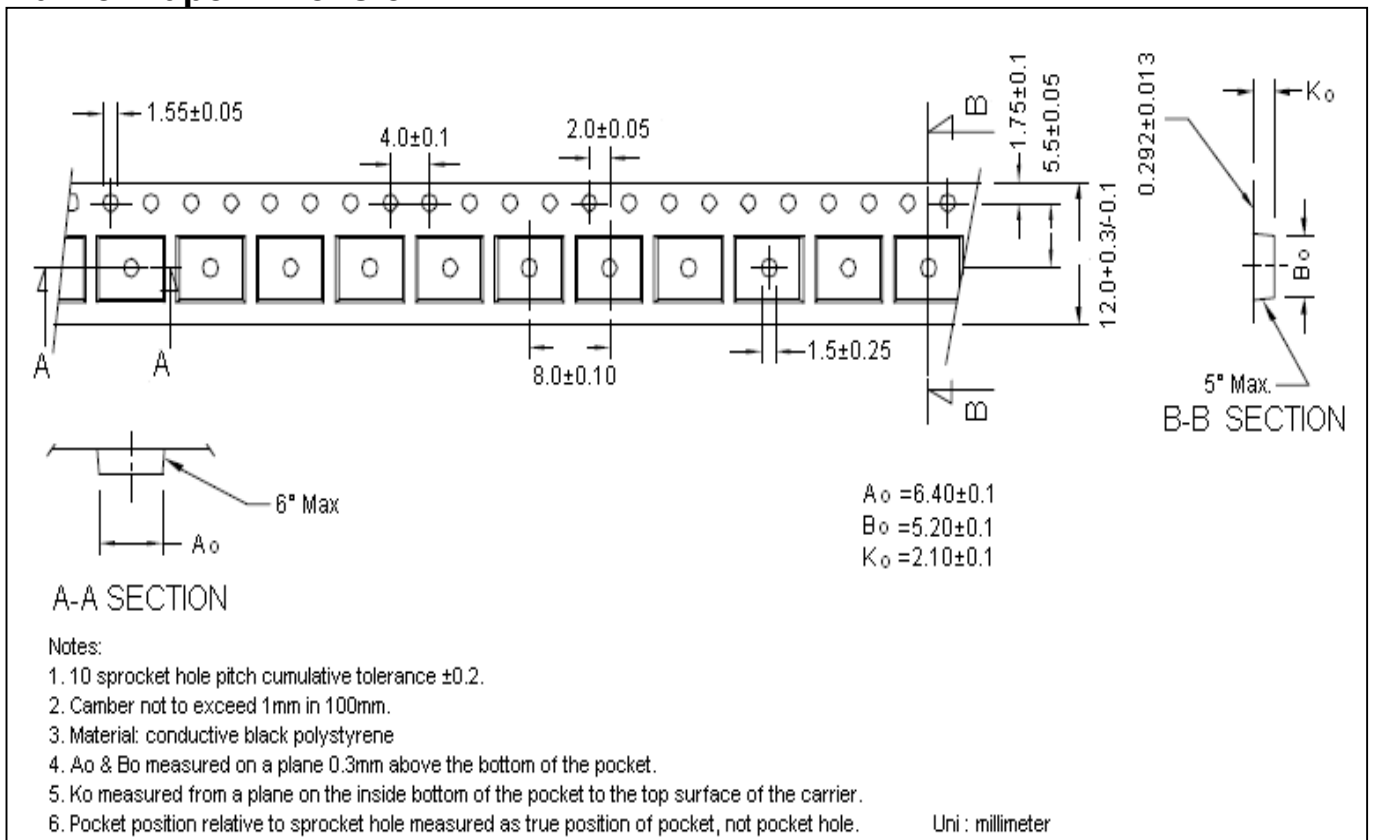
Transient Thermal Response Curves



Reel Dimension



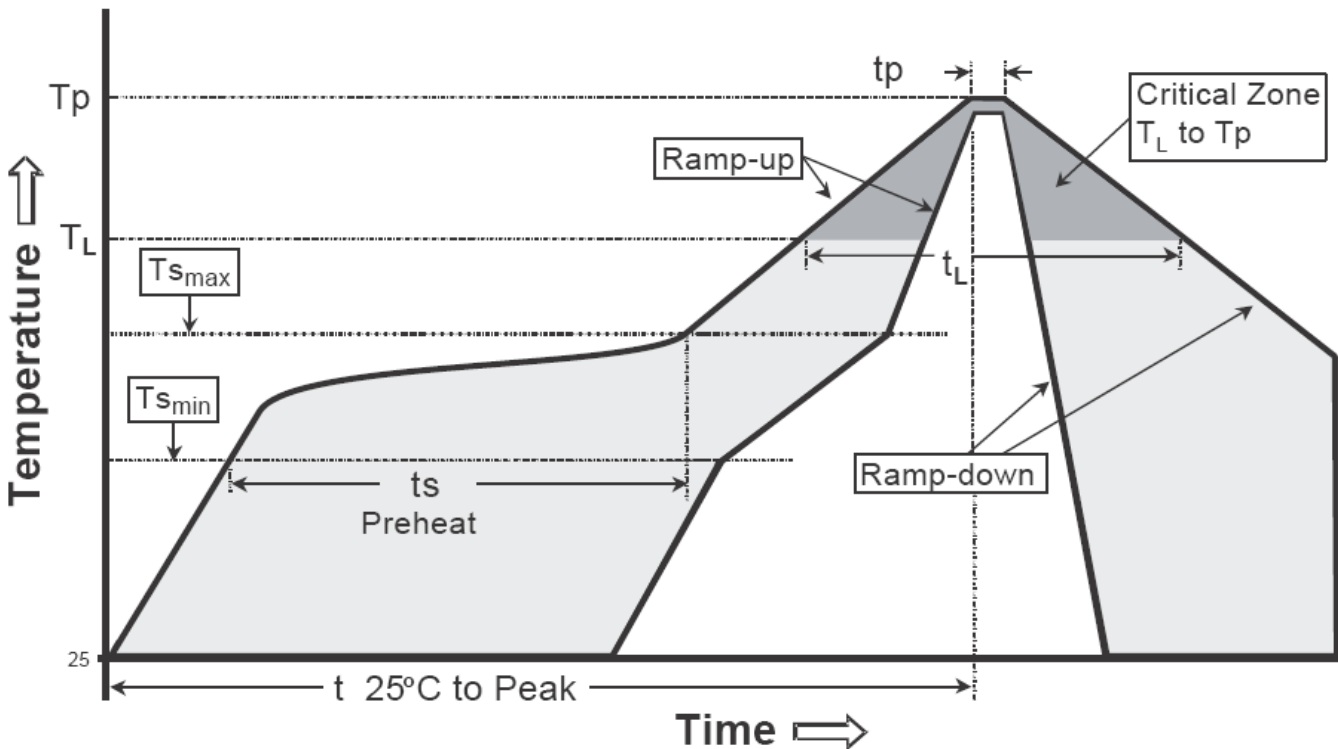
Carrier Tape Dimension



Recommended wave soldering condition

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

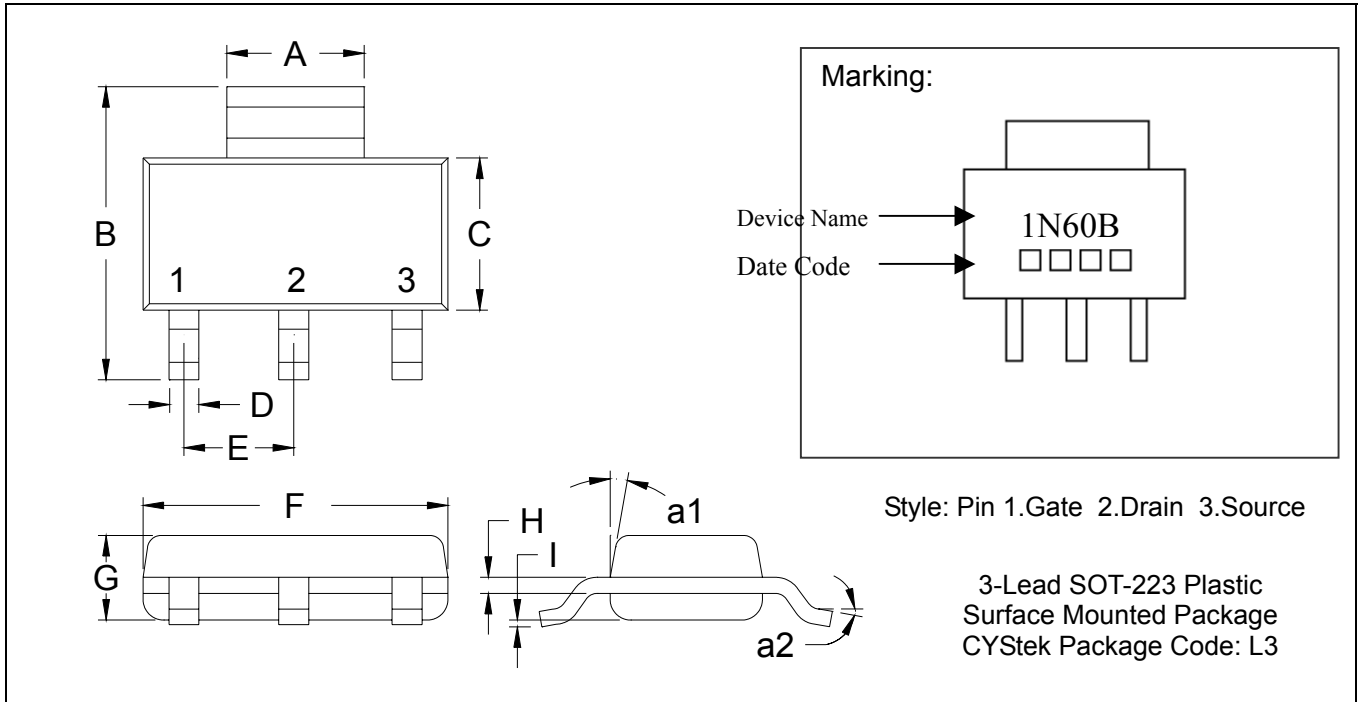
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (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-223 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1142	0.1220	2.90	3.10	G	0.0551	0.0709	1.40	1.80
B	0.2638	0.2874	6.70	7.30	H	0.0098	0.0138	0.23	0.35
C	0.1299	0.1457	3.30	3.70	I	0.0008	0.0039	0.02	0.10
D	0.0236	0.0315	0.60	0.80	a1	*13°	-	*13°	-
E	*0.0906	-	*2.30	-	a2	0°	10°	0°	10°
F	0.2480	0.2638	6.30	6.70					

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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