N-Channel Enhancement Mode Power MOSFET

MTN4N60CJ3

Features

- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free package

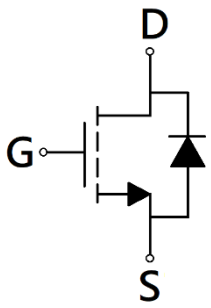
BV_{DSS}	600V
I_D @ V_{GS}=10V, T_C=25°C	4.0A
$R_{DSON(TYP)}$ @ V_{GS}=10V, I_D=2A	1.8Ω

Applications

- Open Framed Power Supply
- Adapter
- STB

Symbol

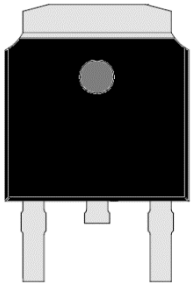
MTN4N60CJ3



G : Gate S : Source D : Drain

Outline

TO-252



G D S

Ordering Information

Device	Package	Shipping
MTN4N60CJ3-0-T3-G	TO-252 (Pb-free lead plating and halogen-free package)	2500 pcs / Tape & Reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T3 : 2500 pcs / tape & reel, 13” reel

Product rank, zero for no rank products

Product name

Absolute Maximum Ratings (T_C=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	4*	A
Continuous Drain Current @ V_{GS}=10V, T_C=100°C		2.5*	
Pulsed Drain Current @ V_{GS}=10V (Note 1)	I_{DM}	16*	
Avalanche Current (Note 1)	I_{AS}	4	
Single Pulse Avalanche Energy @ L=1mH (Note 2)	E_{AS}	8	mJ
Maximum Temperature for Soldering @ Lead at 0.125 in(0.318mm) from case for 10 seconds	T_L	300	°C
Total Power Dissipation (T_C=25℃)	P_D	50	W
Linear Derating Factor		0.4	W/°C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150	°C

*Drain current limited by maximum junction temperature

Note : 1.Pulse width limited by maximum junction temperature.

Thermal Data

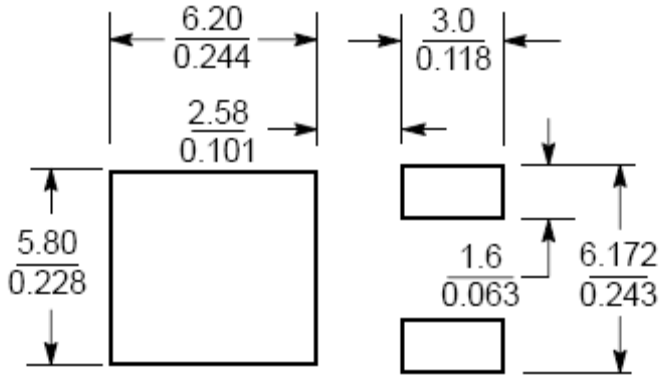
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	2.5	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{\theta JA}$	110	

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	600	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	2.0	-	4.0	V	V_{DS}= V_{GS}, I_D=250μA
*G_{FS}	-	5	-	S	V_{DS}=15V, I_D=2A
I_{GSS}	-	-	±100	nA	V_{GS}=±30V
I_{DSS}	-	-	1	μA	V_{DS}=480V, V_{GS}=0V
*$R_{DS(ON)}$	-	1.8	2.4	Ω	V_{GS}=10V, I_D=2A
Dynamic					
*Qg	-	14.1	-	nC	V_{DD}=480V, I_D=4A, V_{GS}=10V
*Qgs	-	3.2	-		
*Qgd	-	4.9	-		
*$t_{d(ON)}$	-	9.6	-	ns	V_{DD}=300V, I_D=4A, V_{GS}=10V, R_G=10Ω
*tr	-	8.6	-		
*$t_{d(OFF)}$	-	26.8	-		
*t_f	-	10	-		
Ciss	-	539	-	pF	V_{DS}=25V, V_{GS}=0V, f=1MHz
Coss	-	59	-		
Crss	-	16	-		
Source-Drain Diode					
*I_S	-	-	4	A	
*I_{SM}	-	-	16		
*V_{SD}	-	0.84	1.5	V	I_S=4A, V_{GS}=0V
*trr	-	342	-	ns	V_{GS}=0V, I_F=4A, dI_F/dt=100A/μs
*Qrr	-	1.4	-	μC	

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

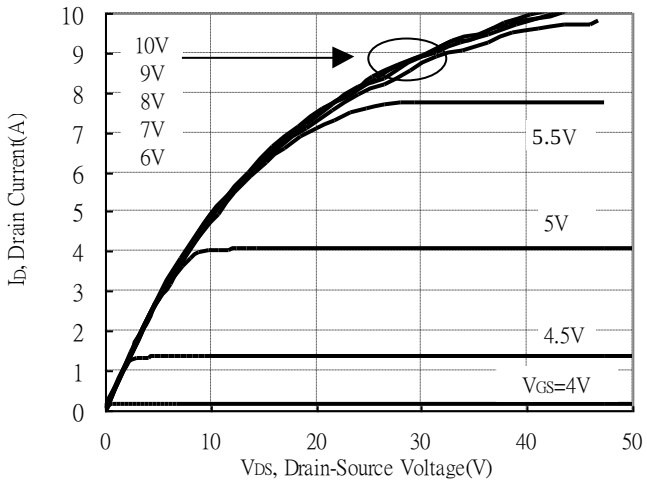
Recommended soldering footprint



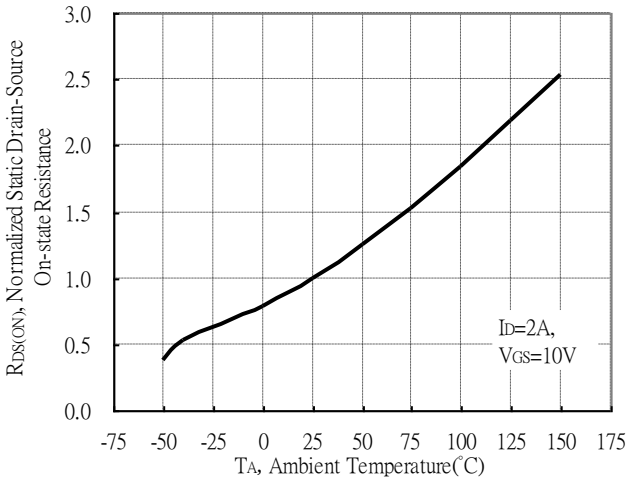
Unit (mm / inch)

Typical Characteristics

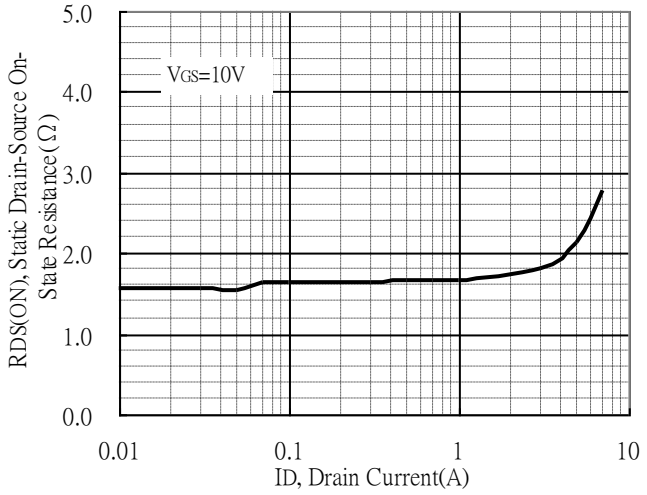
Typical Output Characteristics



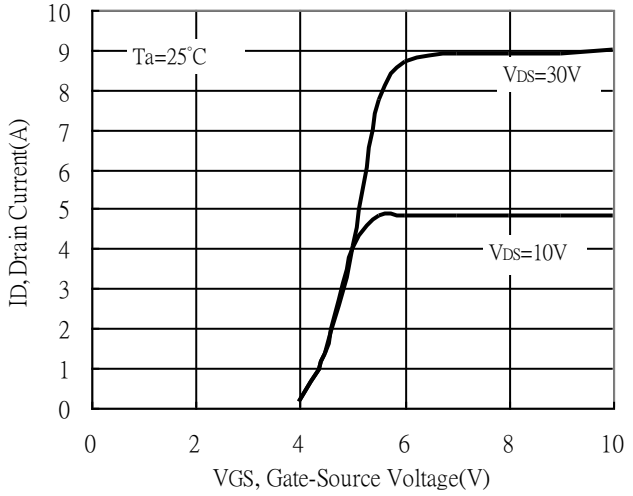
Static Drain-Source On-resistance vs Ambient Temperature



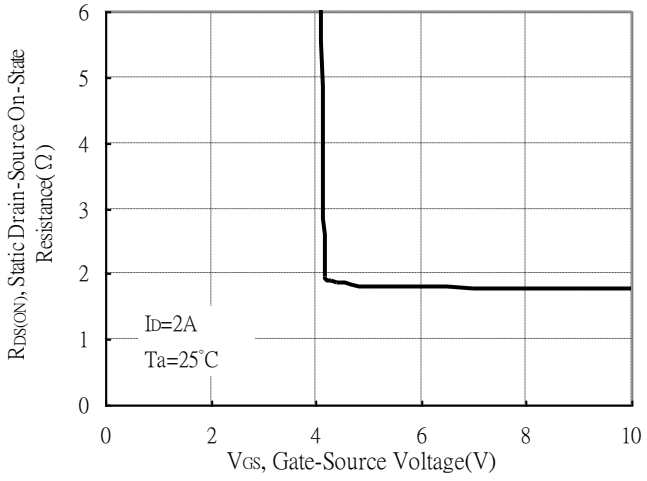
Static Drain-Source On-State resistance vs Drain Current



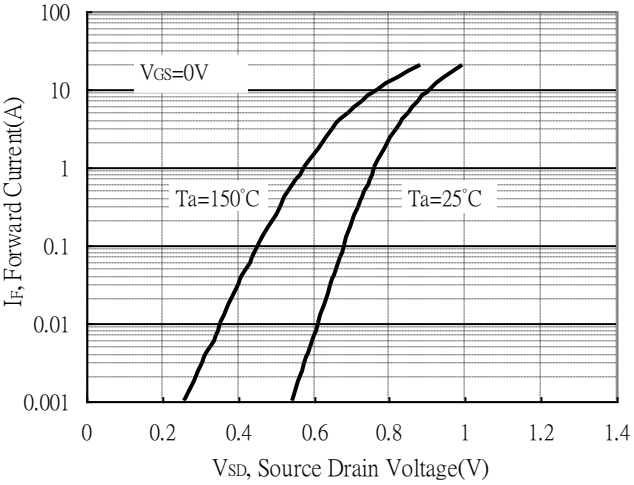
Drain Current vs Gate-Source Voltage



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

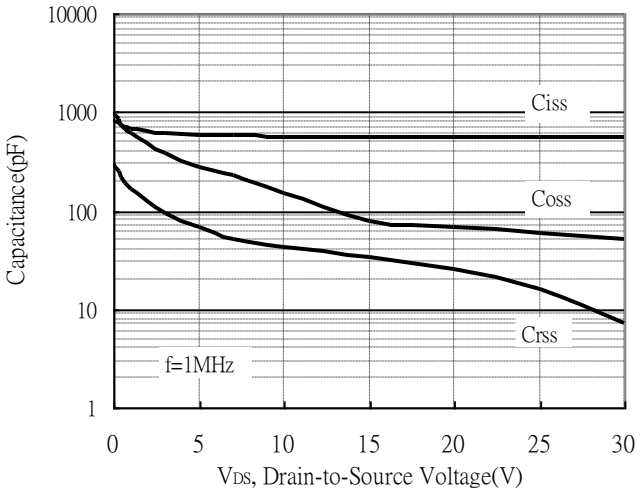


Forward Drain Current vs Source-Drain Voltage

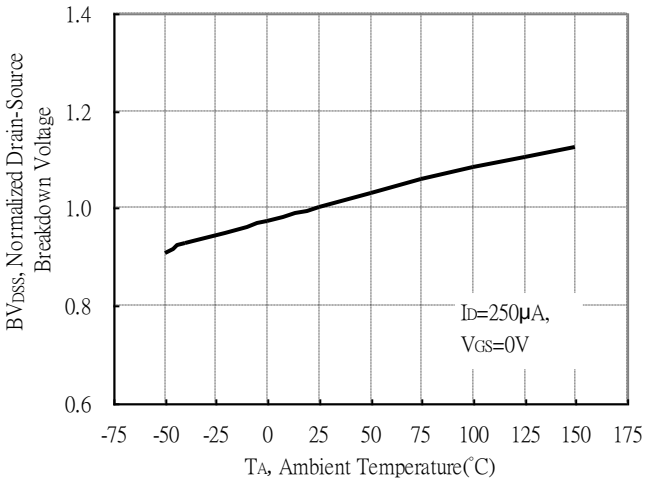


Typical Characteristics(Cont.)

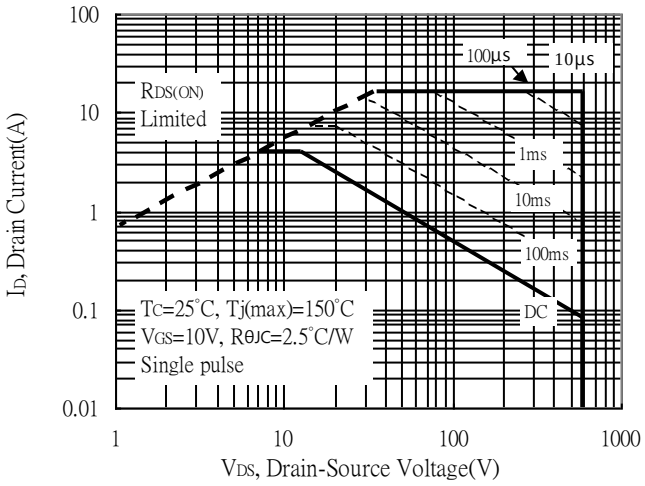
Capacitance vs Reverse Voltage



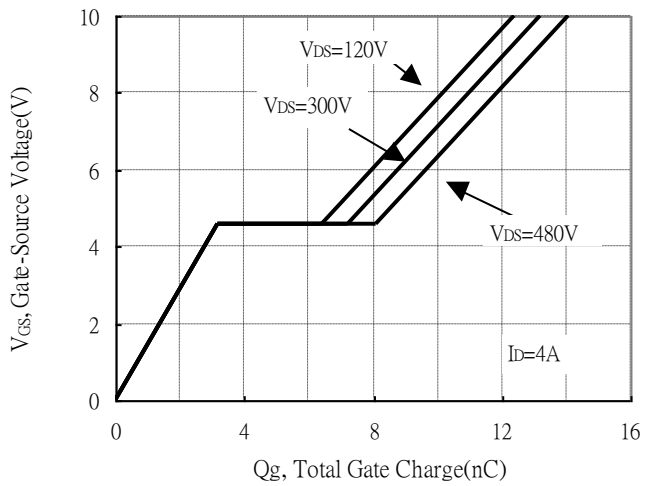
Brekdown Voltage vs Ambient Temperature



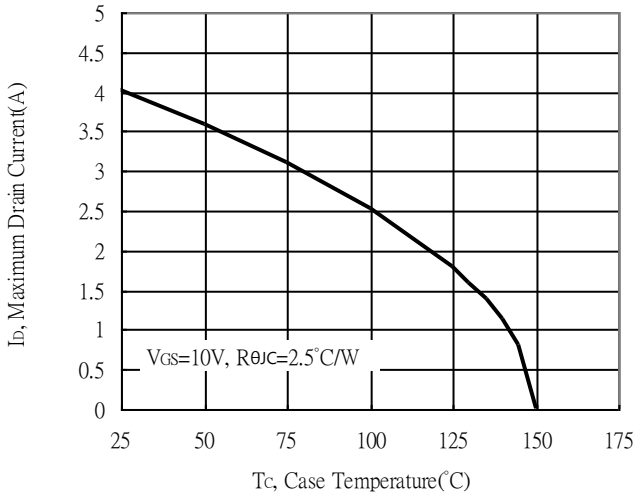
Maximum Safe Operating Area



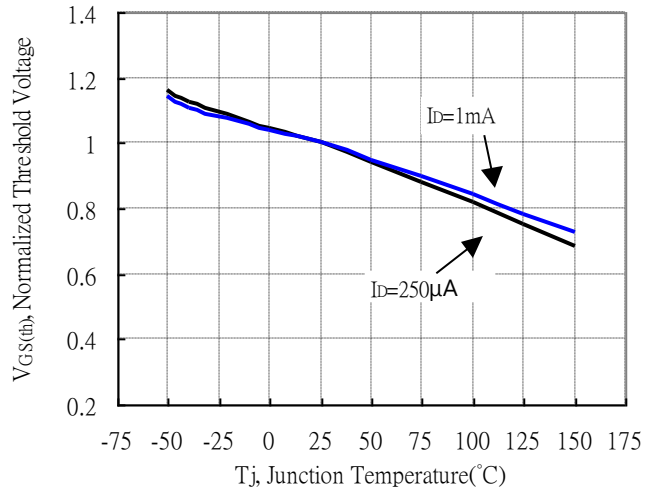
Gate Charge Characteristics



Maximum Drain Current vs Case Temperature

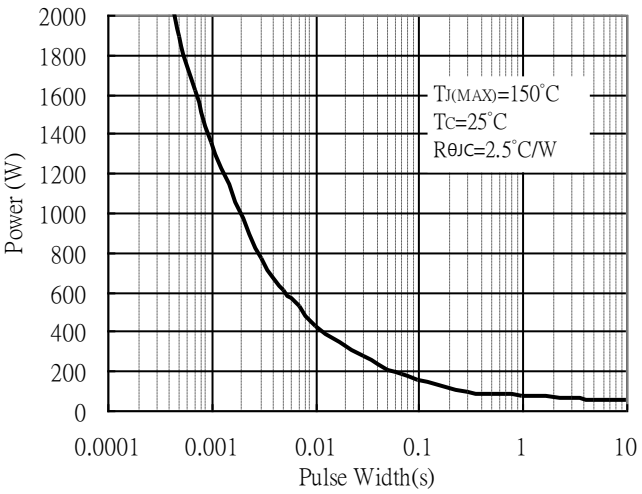


Threshold Voltage vs Junction Tempearture

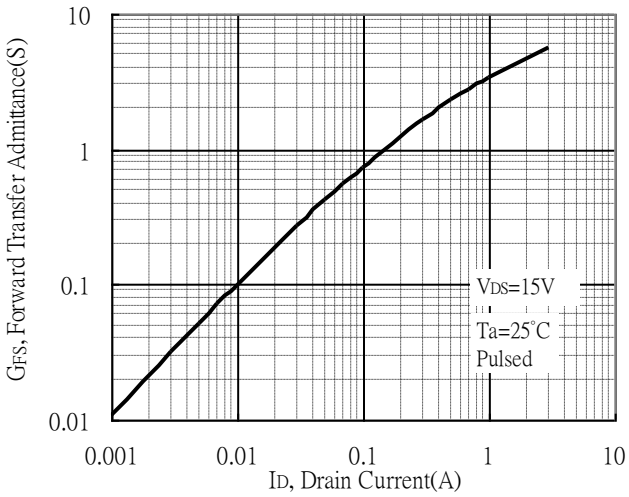


Typical Characteristics(Cont.)

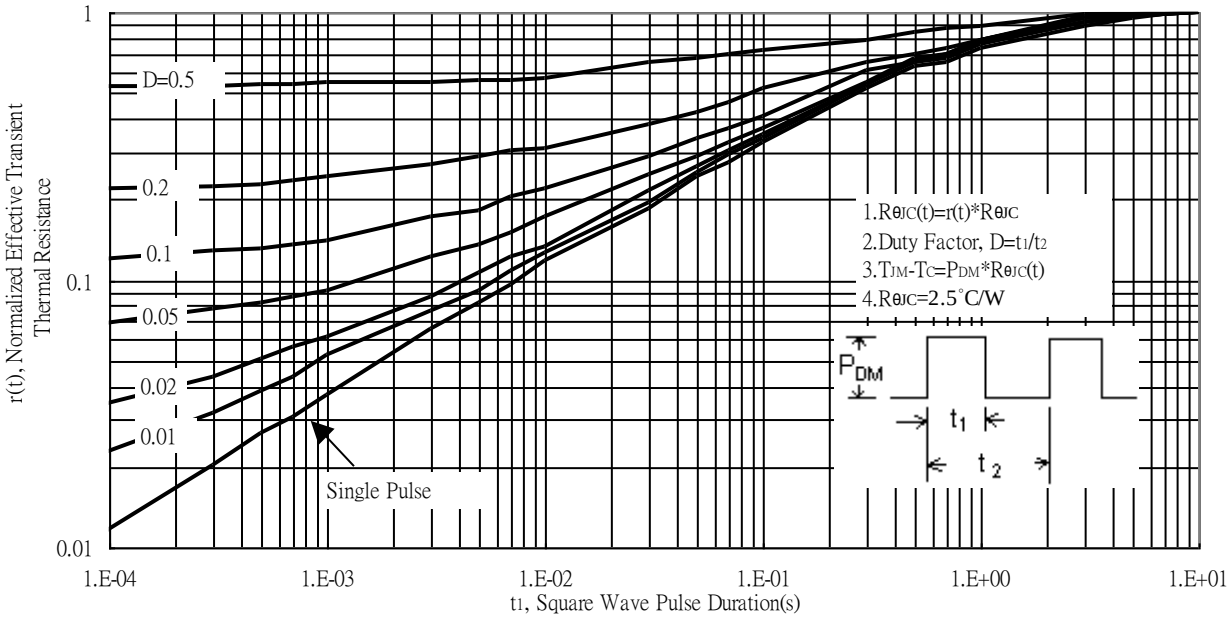
Single Pulse Power Rating, Junction to Case



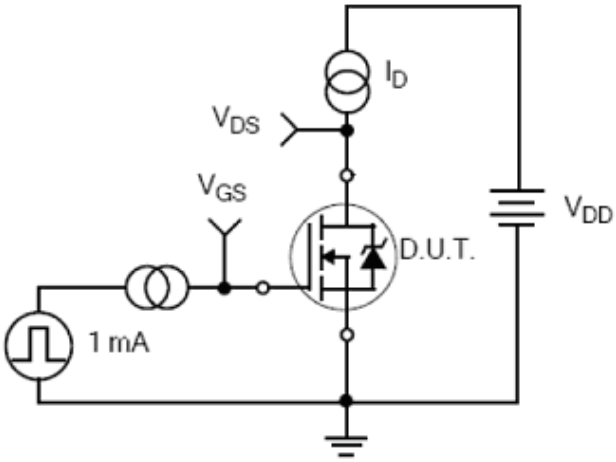
Forward Transfer Admittance vs Drain Current



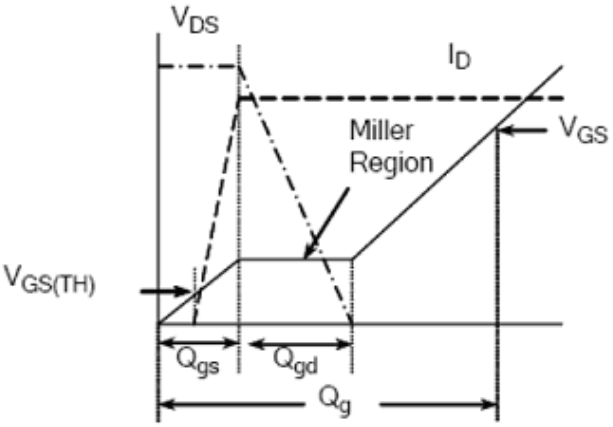
Transient Thermal Response Curves



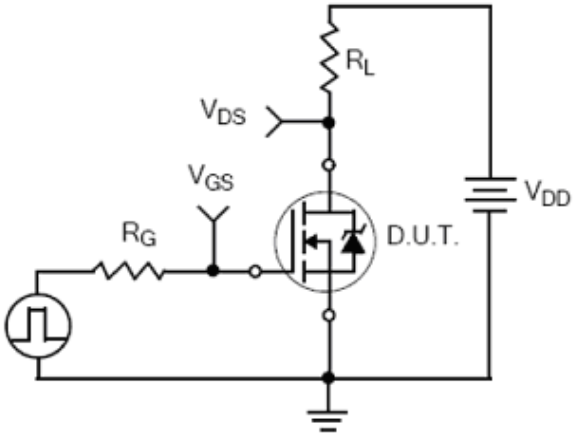
Test Circuits and Waveforms



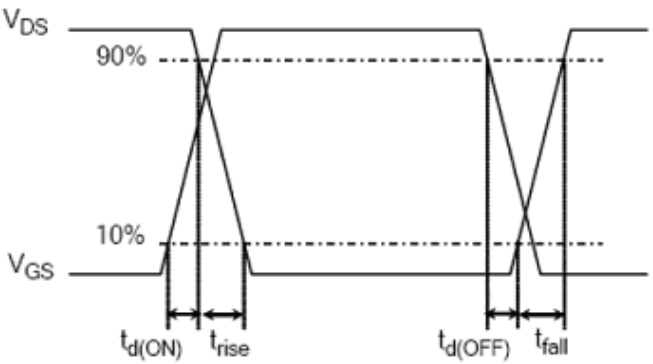
Gate Charge Test Circuit



Gate Charge Waveform

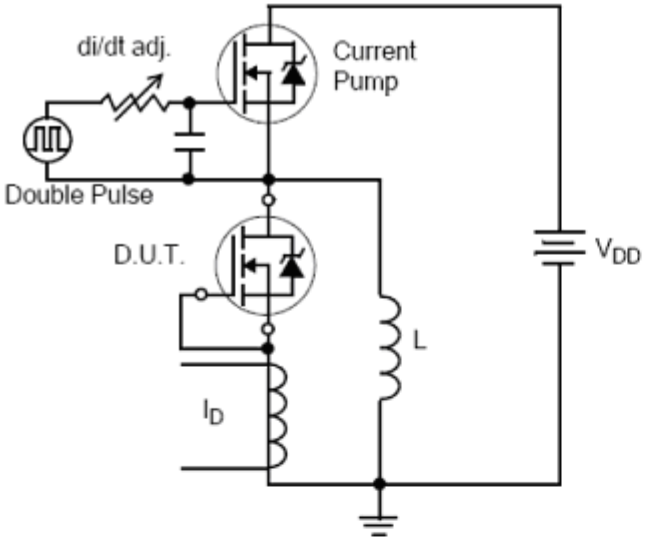


Resistive Switching Test Circuit

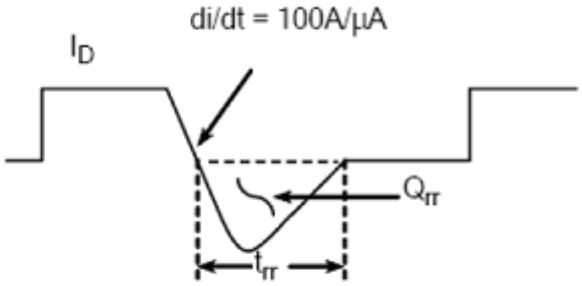


Resistive Switching Waveforms

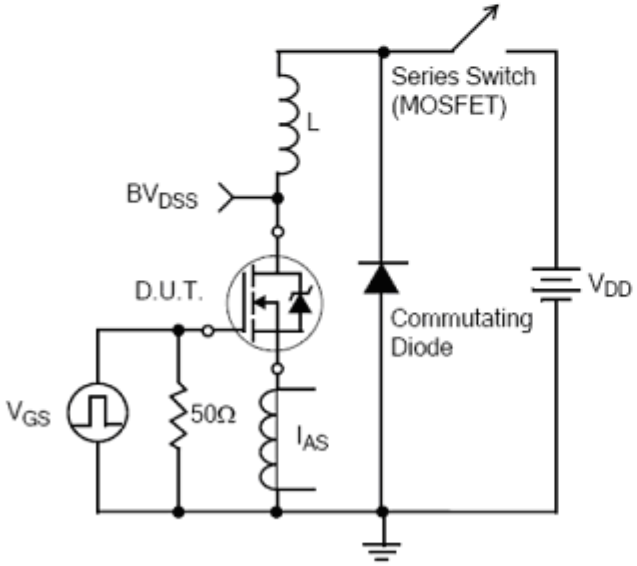
Test Circuits and Waveforms(Cont.)



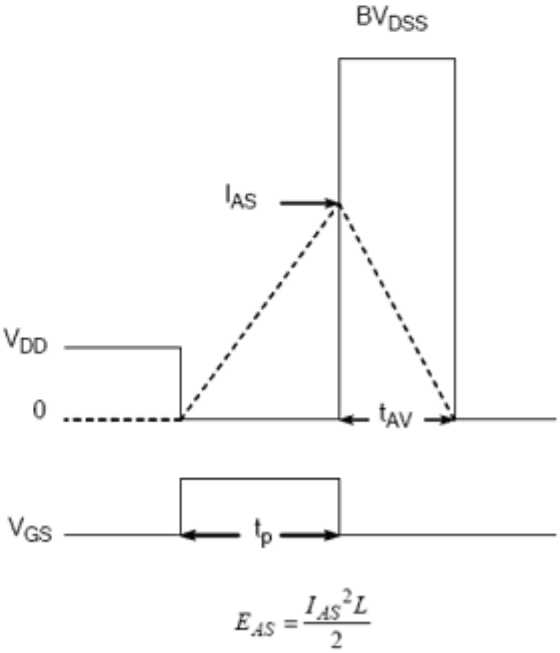
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



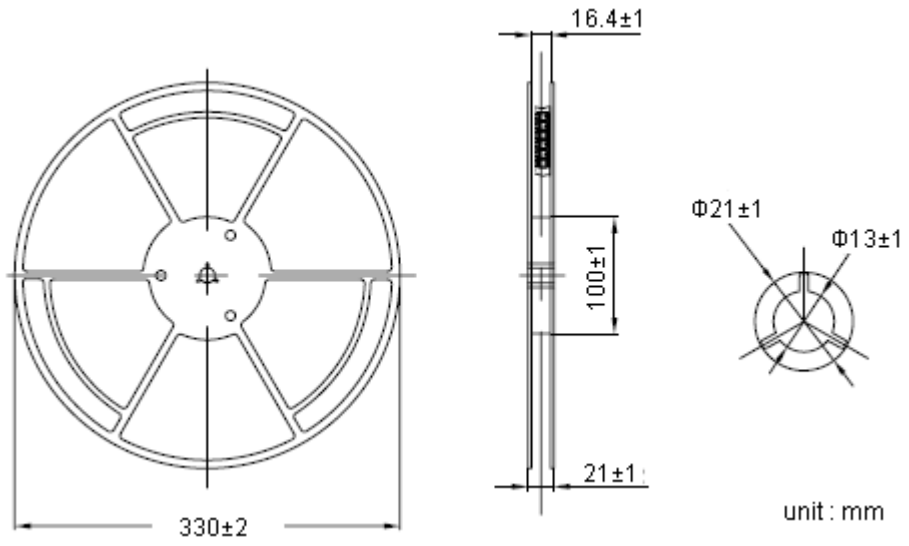
Unclamped Inductive Switching Test Circuit



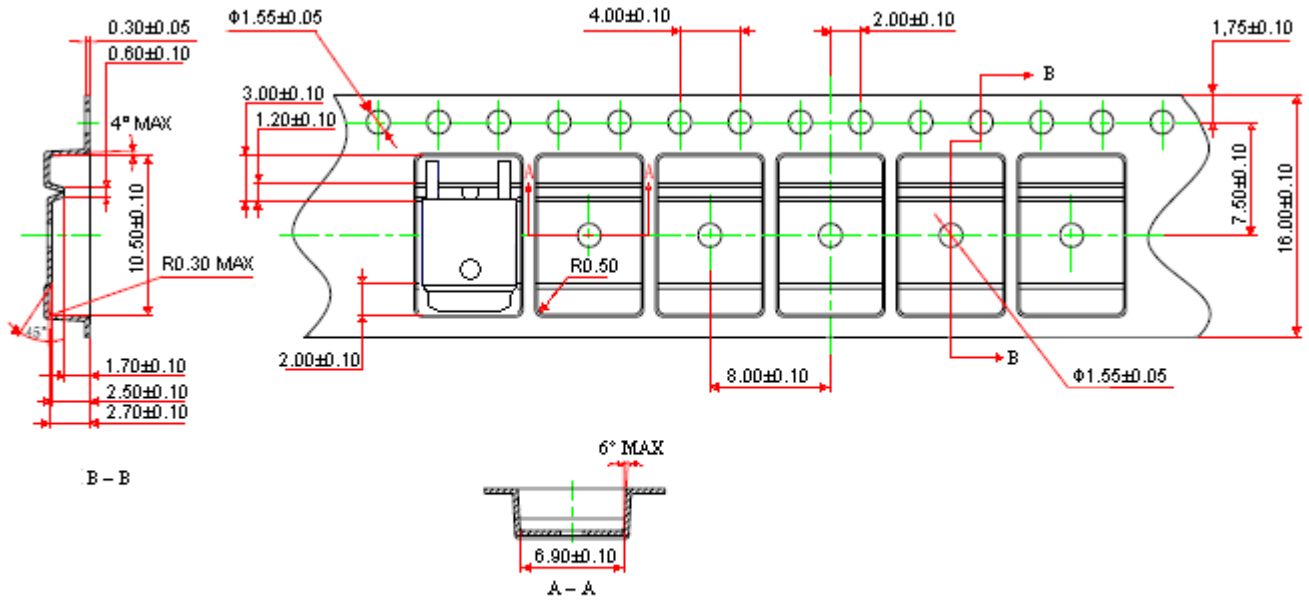
$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Unclamped Inductive Switching Waveforms

Reel Dimension



Carrier Tape Dimension

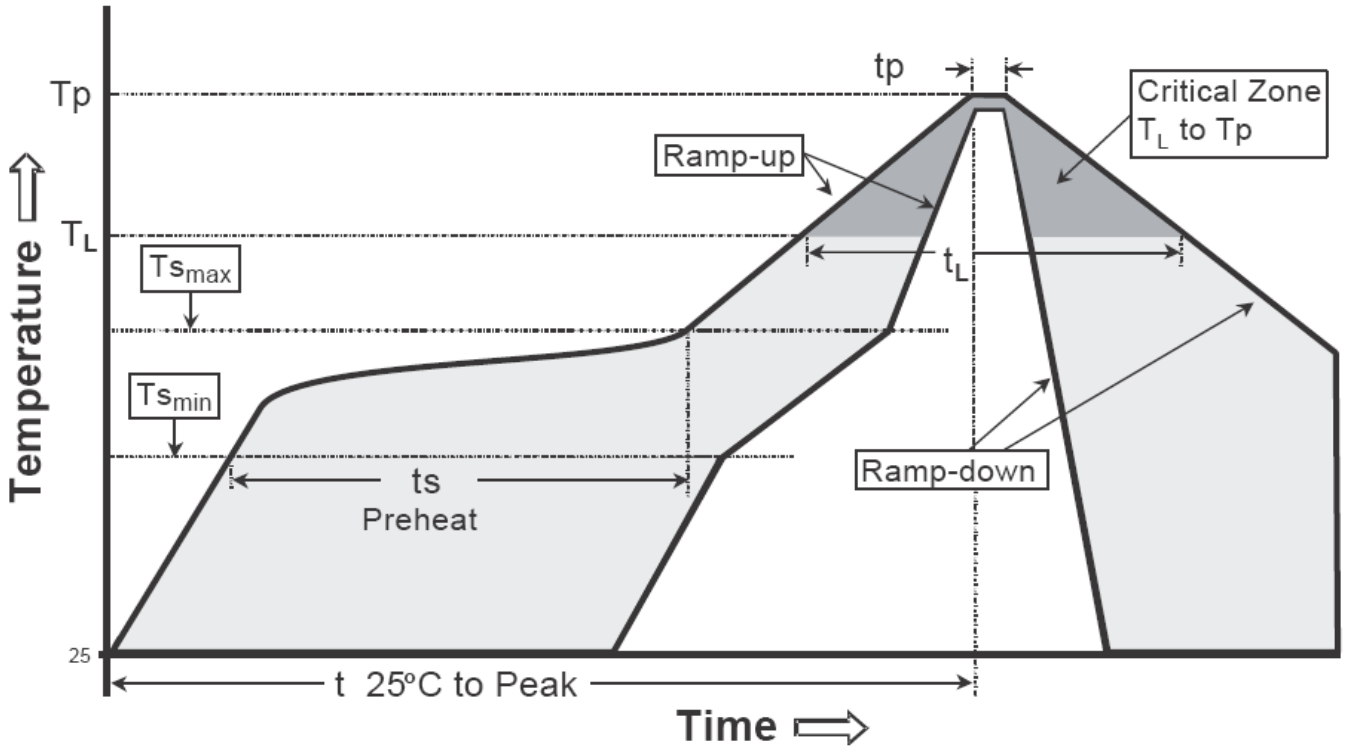


Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated : 10^{5} Ω/□~ 10^{11} Ω/□ unit : mm

Recommended wave soldering condition

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

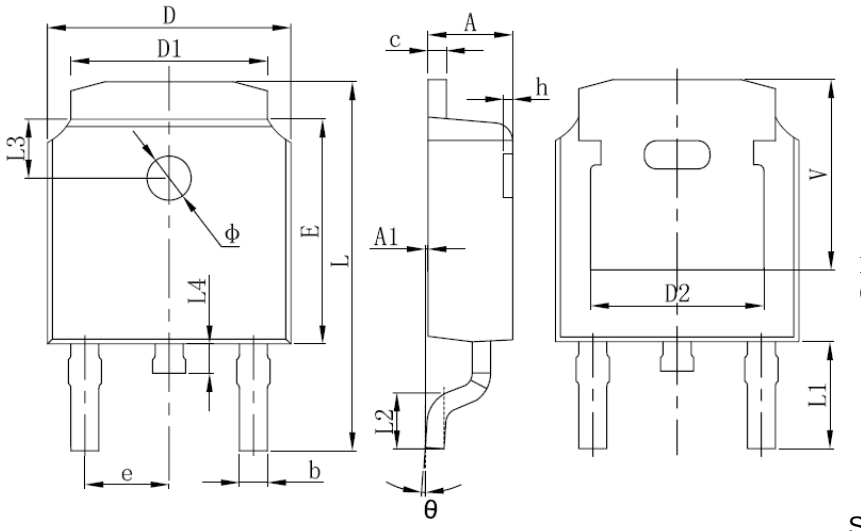
Recommended temperature profile for IR reflow

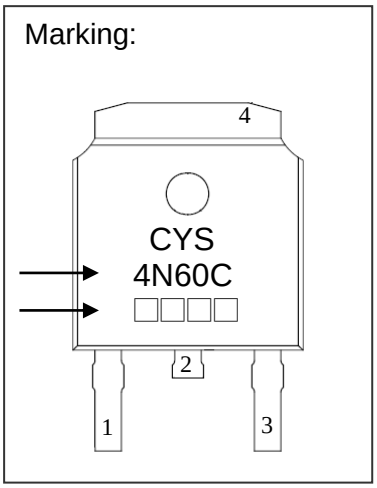


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL)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

TO-252 Dimension





Style: Pin 1.Gate 2.Drain 3.Source 4.Drain

3-Lead TO-252 Plastic Surface Mount Package
CYStek Package Code: J3

Date Code(counting from left to right) :
1st code: year code, the last digit of Christian year
2nd code : month code, Jan→A, Feb→B, Mar→C, Apr→D
May→E, Jun→F, Jul→G, Aug→H, Sep→J,
Oct→K, Nov→L, Dec→M
3rd and 4th codes : production serial number, 01~99

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.087	0.094	2.200	2.400	L	0.382	0.406	9.712	10.312
A1	0.000	0.005	0.000	0.127	L1	0.114 REF		2.900 REF	
b	0.025	0.030	0.635	0.770	L2	0.055	0.067	1.400	1.700
c	0.018	0.023	0.460	0.580	L3	0.063 REF		1.600 REF	
D	0.256	0.264	6.500	6.700	L4	0.024	0.039	0.600	1.000
D1	0.201	0.215	5.100	5.460	Φ	0.043	0.051	1.100	1.300
D2	0.190 REF		4.830 REF		θ	0°	8°	0°	8°
E	0.236	0.244	6.000	6.200	h	0.000	0.012	0.000	0.300
e	0.086	0.094	2.186	2.386	V	0.207 REF		5.250 REF	

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.