

N-Channel Enhancement Mode Power MOSFET

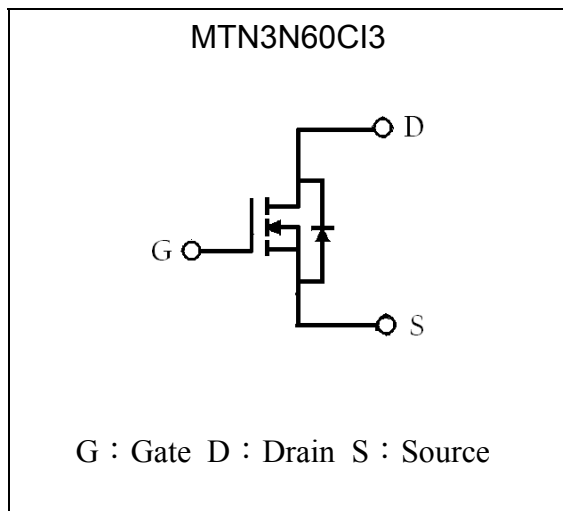
MTN3N60CI3

BV_{DSS}	600V
I_D@V_{GS}=10V, T_C=25°C	3A
R_{DS(ON)}@V_{GS}=10V, I_D=1.5A	3Ω (typ)

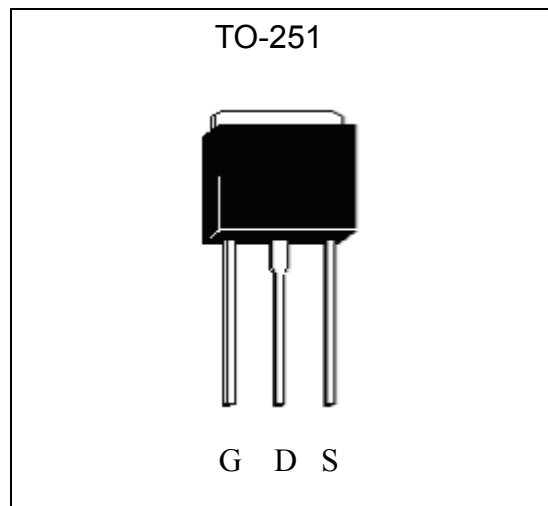
Features

- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

Symbol

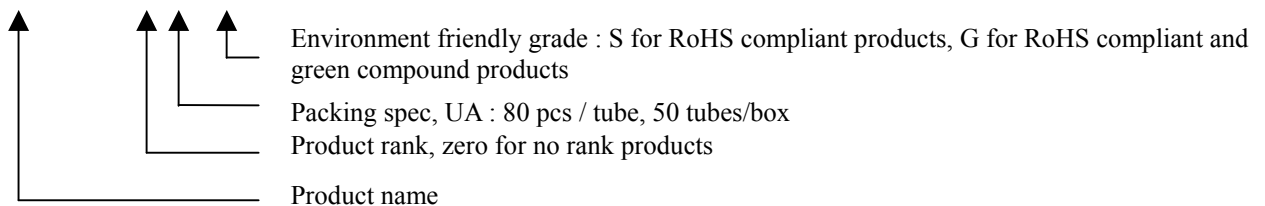


Outline



Ordering Information

Device	Package	Shipping
MTN3N60CI3-0-UA-G	TO-251 (RoHS compliant and halogen-free package)	80 pcs/tube, 50 tubes/box





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 @T _C =25°C, V _{GS} =10V	I _D	3	A
Continuous Drain Current @T _C =100°C, V _{GS} =10V		1.9	
Pulsed Drain Current (Note 1)	I _{DM}	12	
Single Pulse Avalanche Energy (Note 2)	E _{AS}	22.5	mJ
Single Pulse Avalanche Current (Note 1)	I _{AS}	3	A
Repetitive Avalanche Energy (Note 1)	E _{AR}	3.3	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 _A =25°C)	P _D	1.14	W
Total Power Dissipation (T _C =25°C)		50	
Linear Derating Factor		0.4	W/°C
Operating Junction and Storage Temperature	T _J , T _{stg}	-55~+150	°C

Note : 1.Repetitive rating; pulse width limited by maximum junction temperature.

2. I_{AS}=3A, V_{DD}=50V, L=5mH, V_{GS}=10V, starting T_J=+25°C. 100% tested by conditions of L=1mH, I_{AS}=3A, V_{GS}=10V, V_{DD}=50V.

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{th,j-c}	2.5	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{th,j-a}	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, T _J =25°C
ΔBV _{DSS} /ΔT _J	-	0.7	-	V/°C	Reference to 25°C, I _D =250μA
V _{GS(th)}	2	-	4	V	V _{DS} = V _{GS} , I _D =250μA
*G _{FS}	-	3	-	S	V _{DS} =15V, I _D =1.5A
I _{GSS}	-	-	±100	nA	V _{GS} =±30V
I _{DSS}	-	-	1	μA	V _{DS} =600V, V _{GS} =0V
	-	-	10		V _{DS} =480V, V _{GS} =0V, T _J =125°C
*R _{DS(ON)}	-	3	3.7	Ω	V _{GS} =10V, I _D =1.5A
Dynamic					
*Q _g	-	11.6	-	nC	I _D =3A, V _{DD} =480V, V _{GS} =10V
*Q _{gs}	-	2.2	-		
*Q _{gd}	-	4.9	-		
*t _{d(ON)}	-	7.8	-	ns	V _{DS} =300V, I _D =3A, V _{GS} =10V, R _G =25Ω
*t _r	-	8.6	-		
*t _{d(OFF)}	-	21.4	-		
*t _f	-	10.6	-		

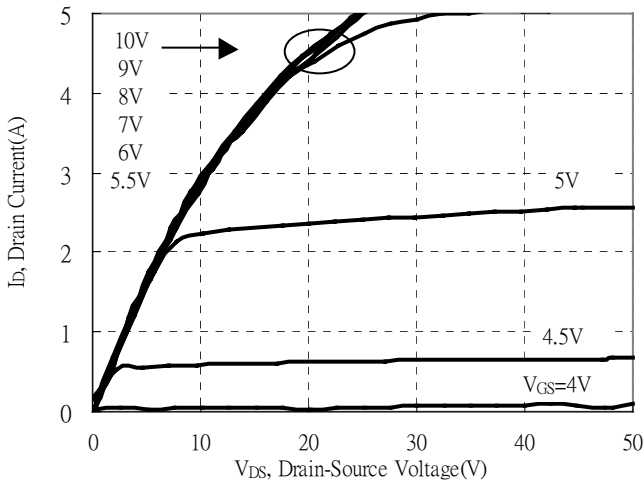


Ciss	-	332	-	pF	V _{GS} =0V, V _{DS} =25V, f=1MHz
Coss	-	44	-		
Crss	-	15	-		
Rg	-	3.3	-	Ω	f=1MHz
Source-Drain Diode					
*I _S	-	-	3	A	
*I _{SM}	-	-	12		
*V _{SD}	-	0.84	1.5	V	I _S =3A, V _{GS} =0V
*trr	-	345	-	ns	V _{GS} =0V, I _F =3A, dI _F /dt=100A/μs
*Qrr	-	1.2	-	μC	

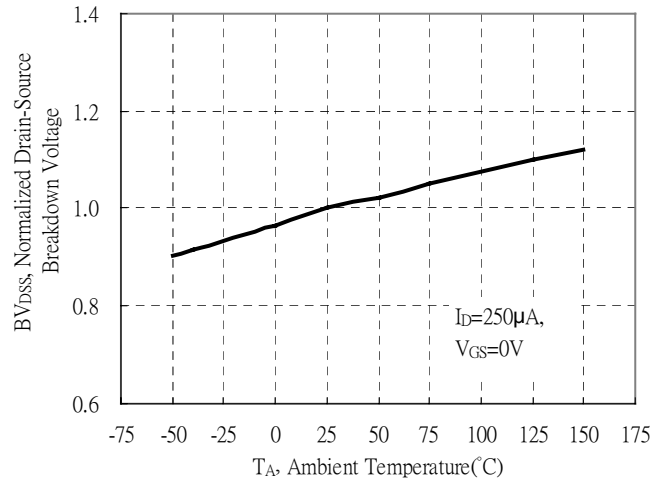
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Typical Characteristics

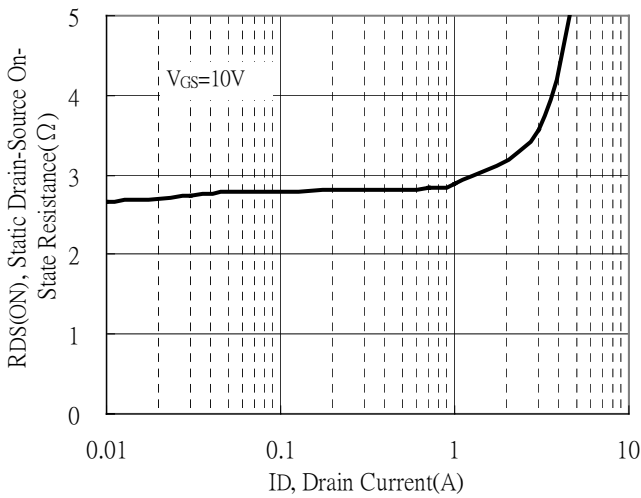
Typical Output Characteristics



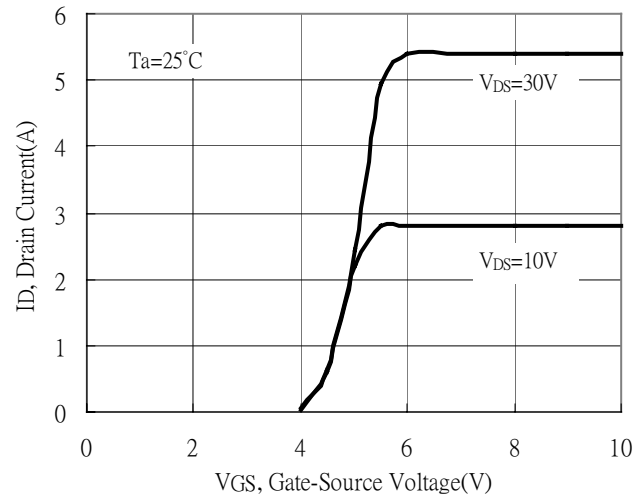
Brekdown Voltage vs Ambient Temperature



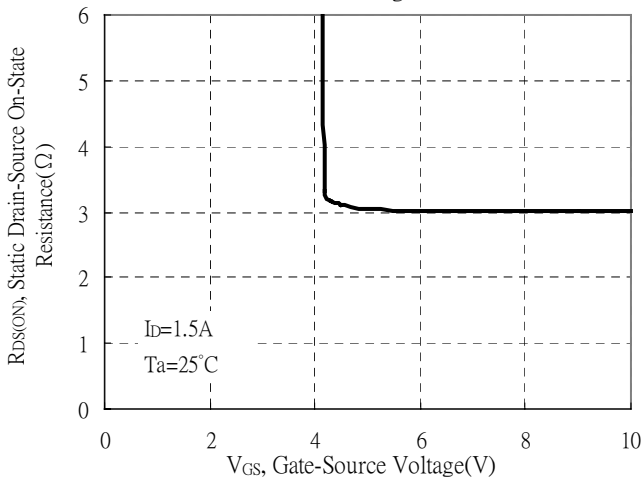
Static Drain-Source On-State resistance vs Drain Current



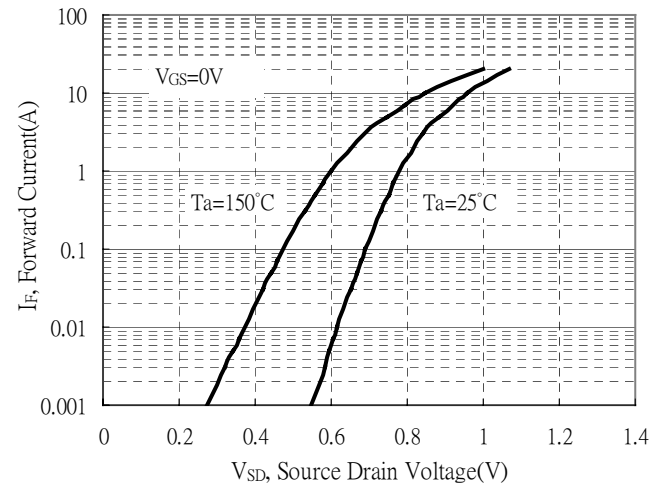
Drain Current vs Gate-Source Voltage



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

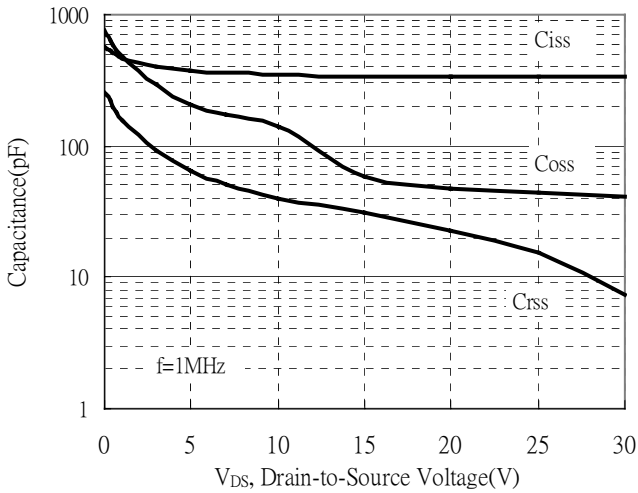


Forward Drain Current vs Source-Drain Voltage

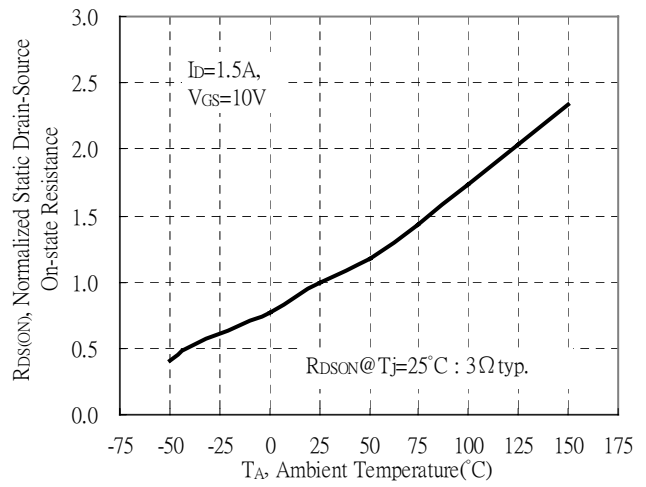


Typical Characteristics(Cont.)

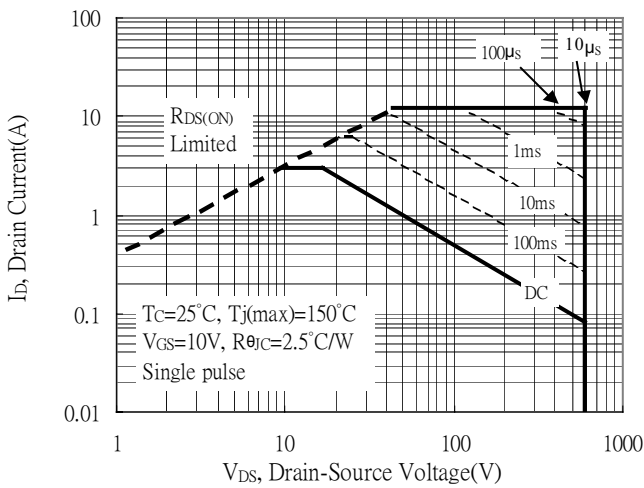
Capacitance vs Reverse Voltage



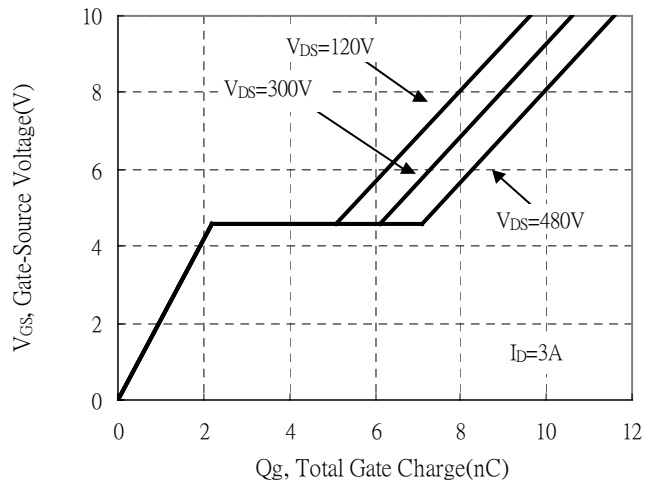
Static Drain-Source On-resistance vs Ambient Temperature



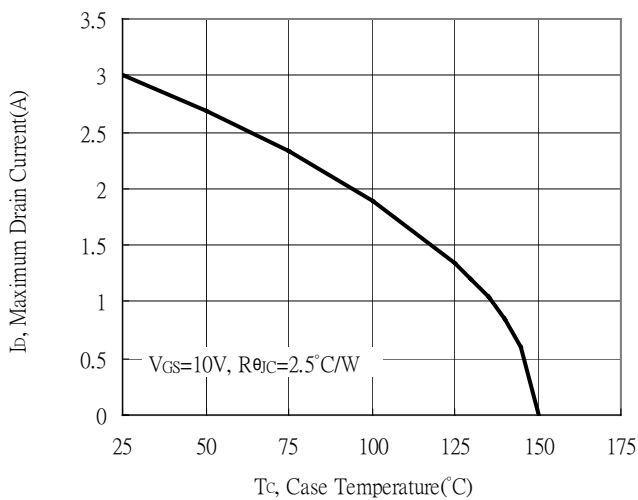
Maximum Safe Operating Area



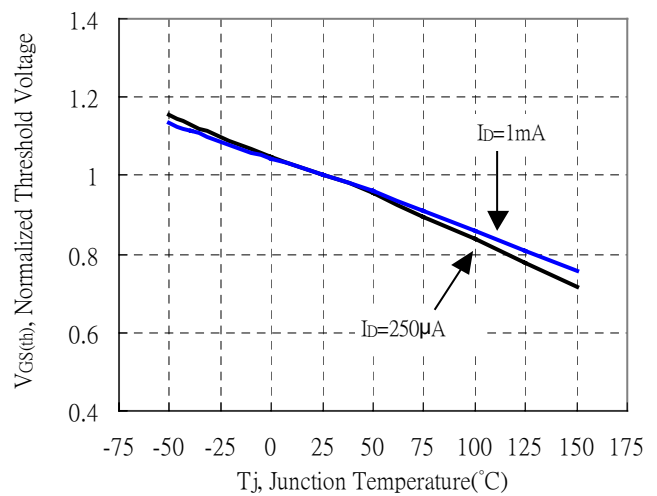
Gate Charge Characteristics



Maximum Drain Current vs Case Temperature

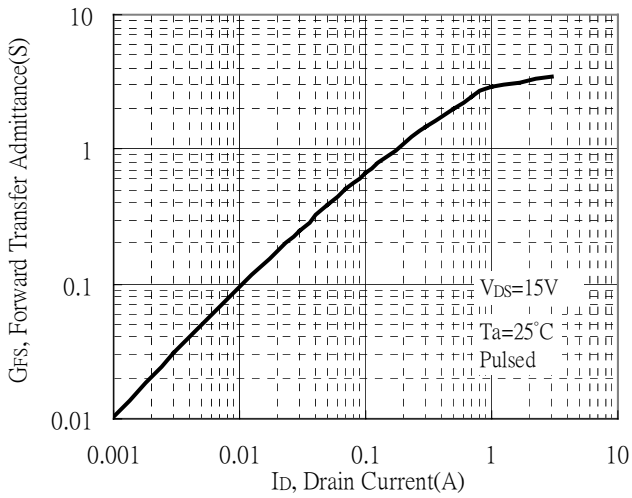


Threshold Voltage vs Junction Temperature

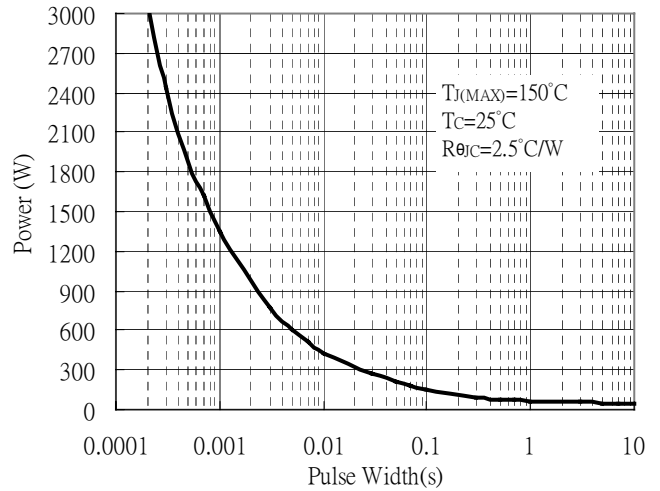


Typical Characteristics(Cont.)

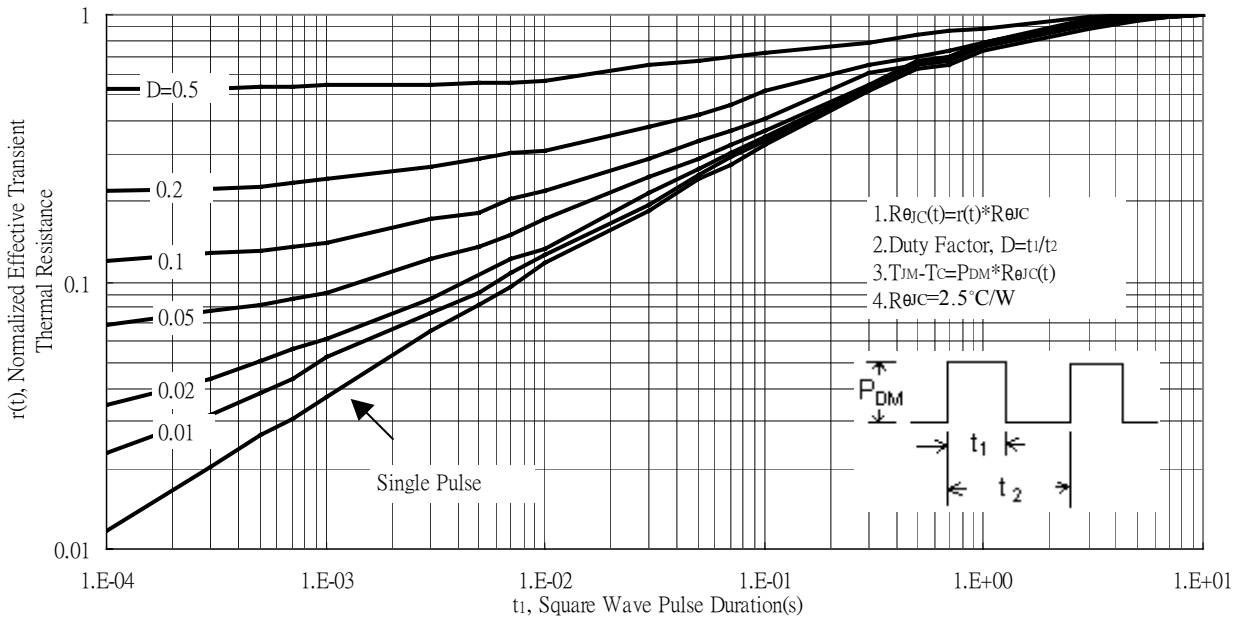
Forward Transfer Admittance vs Drain Current



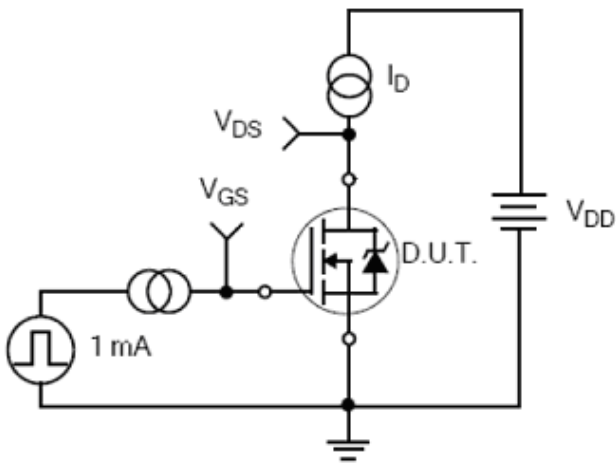
Single Pulse Power Rating, Junction to Case



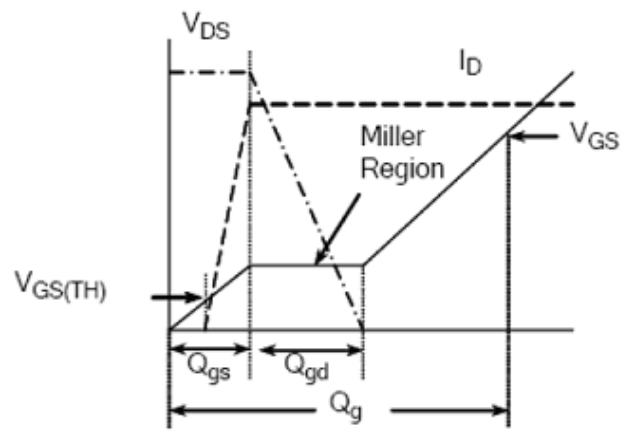
Transient Thermal Response Curves



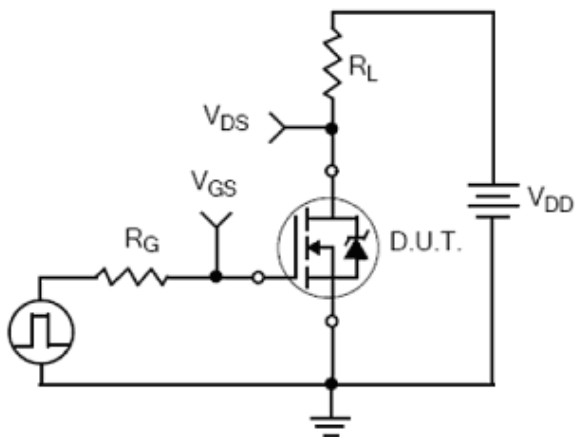
Test Circuit and Waveforms



Gate Charge Test Circuit



Gate Charge Waveform

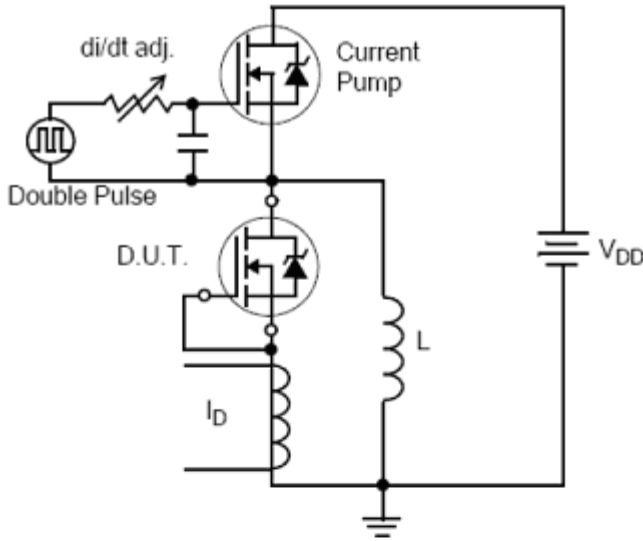


Resistive Switching Test Circuit

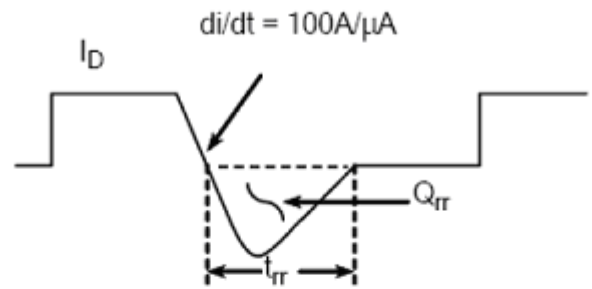


Resistive Switching Waveforms

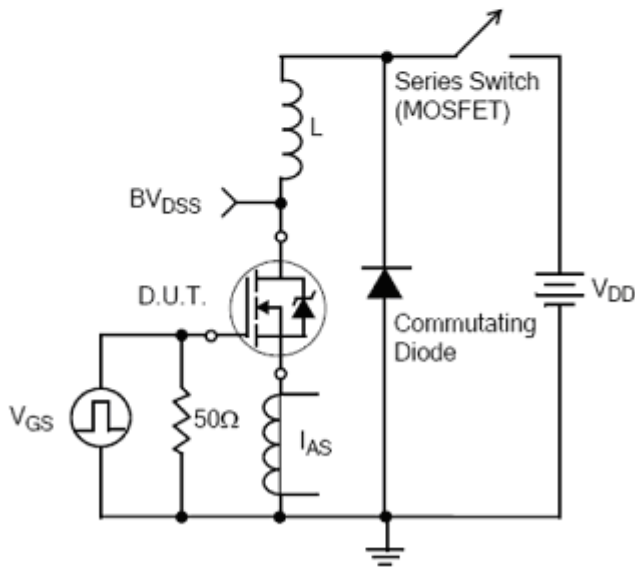
Test Circuit and Waveforms(Cont.)



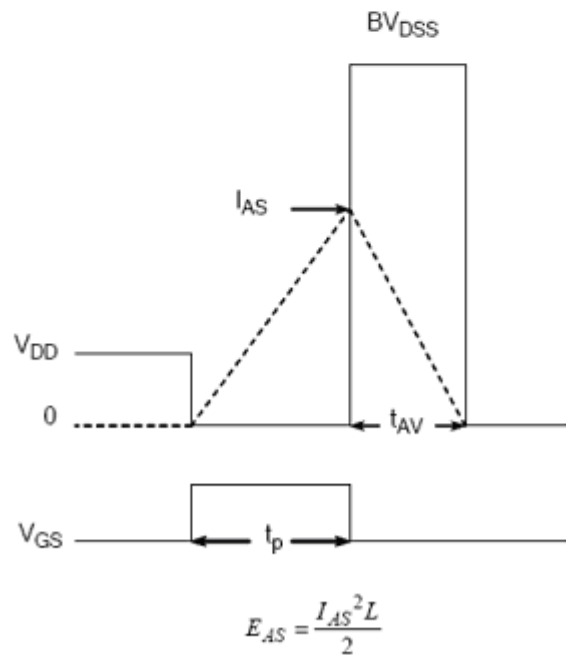
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



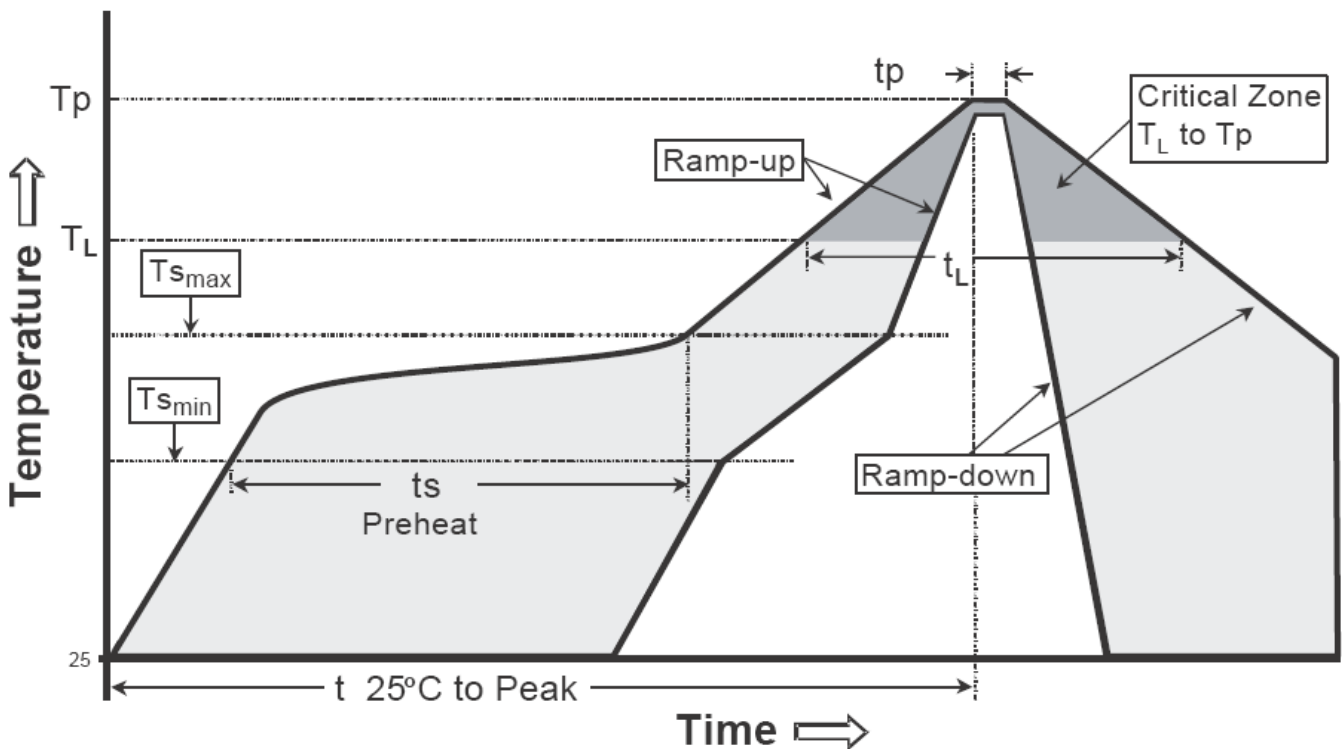
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Recommended wave soldering condition

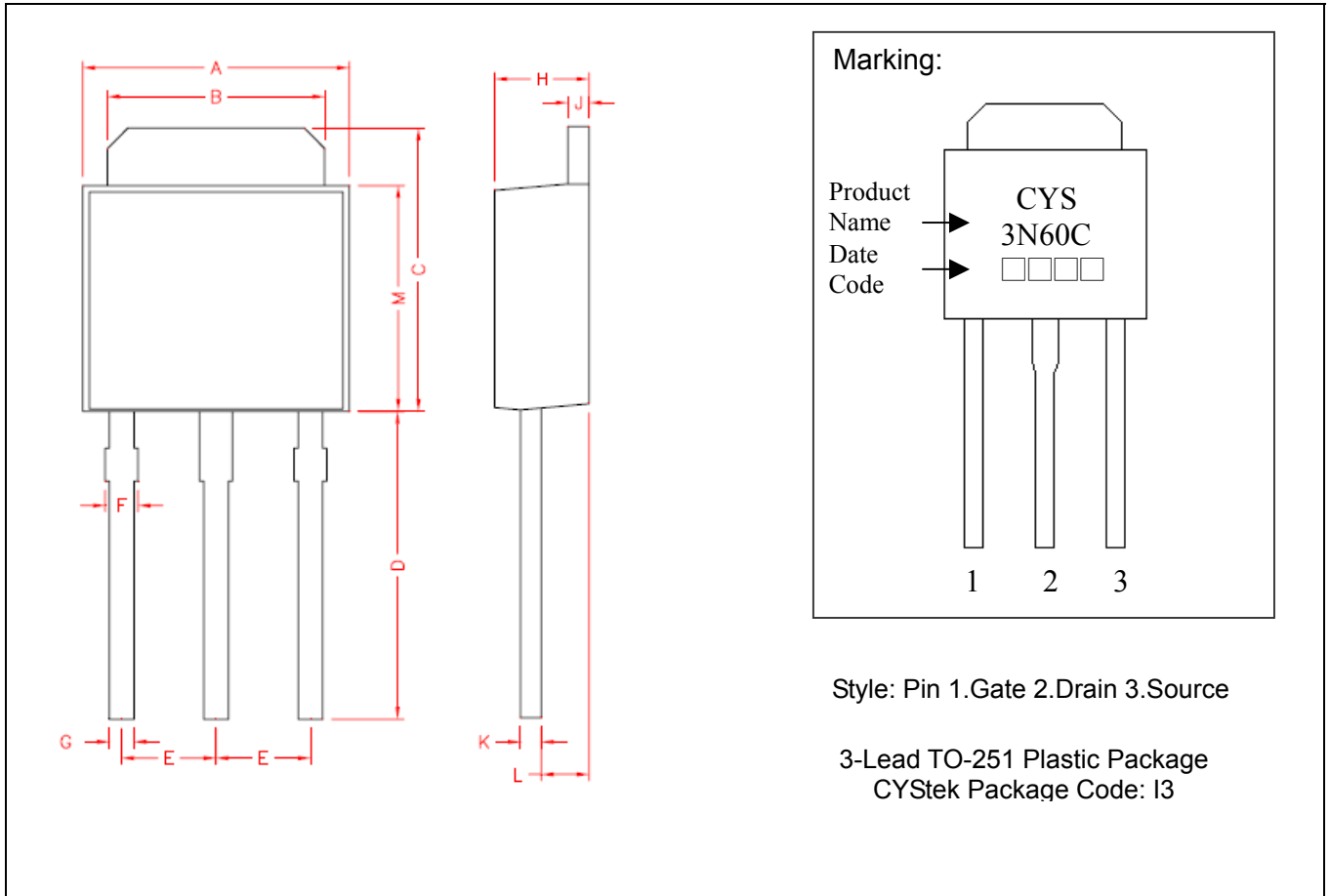
Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

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.

TO-251 Dimension



DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	6.40	6.80	0.252	0.268	G	0.50	0.70	0.020	0.028
B	5.20	5.50	0.205	0.217	H	2.20	2.40	0.087	0.094
C	6.80	7.20	0.268	0.283	J	0.45	0.55	0.018	0.022
D	7.20	7.80	0.283	0.307	K	0.45	0.60	0.018	0.024
E	2.30	REF	0.091	REF	L	0.90	1.50	0.035	0.059
F	0.60	0.90	0.024	0.035	M	5.40	5.80	0.213	0.228

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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