N-Channel Enhancement Mode Power MOSFET

MTN6N65BI3S

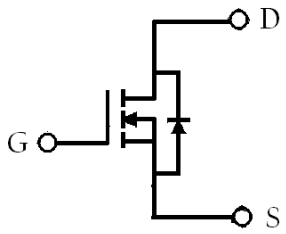
BV_{DSS}	**650V**
I_D@V_{GS}=10V, T_C=25°C	**6A**
$R_{DS(ON)}$@V_{GS}=10V, I_D=3A	**1.2Ω(typ)**

Features

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

Symbol

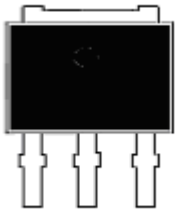
MTN6N65BI3S



G：Gate D：Drain S：Source

Outline

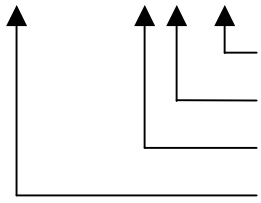
TO-251S



G D S

Ordering Information

Device	Package	Shipping
MTN6N65BI3S-0-UA-G	TO-251S (RoHS compliant and halogen-free package)	80 pcs/tube, 50 tubes/box



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

Packing spec, UA : 80 pcs / tube, 50 tubes/box

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}	650	V
Gate-Source Voltage	V_{GS}	±30	
Continuous Drain Current @T_C=25°C, V_{GS}=10V	I_D	6	A
Continuous Drain Current @T_C=100°C, V_{GS}=10V		3.8	
Pulsed Drain Current (Note 1)	I_{DM}	24	
Single Pulse Avalanche Energy (Note 2)	E_{AS}	106	mJ
Avalanche Current (Note 1)	I_{AS}	5.5	A
Repetitive Avalanche Energy (Note 1)	E_{AR}	9	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℃)	P_D	1.25	W
Total Power Dissipation (T_C=25℃)		89	W
Linear Derating Factor		0.71	W/°C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150	°C

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

2. I_{AS}=5.5A, V_{DD}=50V, L=7mH, V_{GS}=10V, starting T_J=+25℃. 100% tested by conditions of L=7mH, I_{AS}=3A, V_{GS}=10V, V_{DD}=50V.

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	1.4	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	100	

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

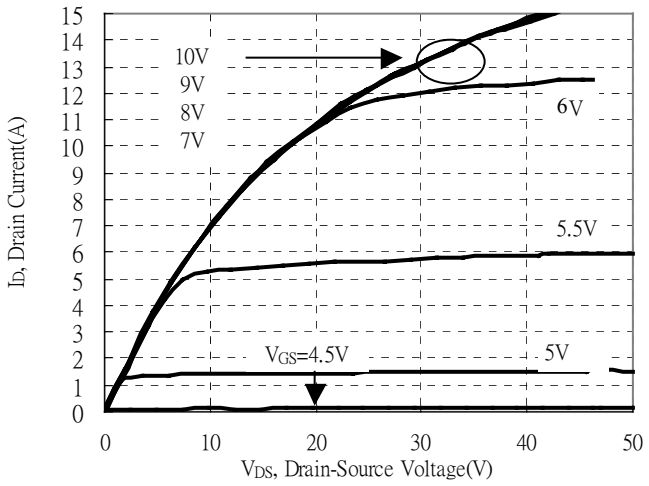
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	650	-	-	V	V_{GS}=0V, I_D=250μA, Tj=25℃
$\Delta BV_{DSS}/\Delta Tj$	-	0.6	-	V/°C	Reference to 25°C, I_D=250μA
$V_{GS(th)}$	2	-	4	V	V_{DS} = V_{GS}, I_D=250μA
*G_{FS}	-	8.2	-	S	V_{DS} =10V, I_D=3A
I_{GSS}	-	-	±100	nA	V_{GS}=±30V
I_{DSS}	-	-	1	μA	V_{DS} =650V, V_{GS} =0V
	-	-	10		V_{DS} =520V, V_{GS} =0V, T_C=125°C
*$R_{DS(ON)}$	-	1.2	1.5	Ω	V_{GS} =10V, I_D=3A
Dynamic					
*Qg	-	28.6	-	nC	I_D=6A, V_{DD}=520V, V_{GS}=10V
*Qgs	-	5.4	-		
*Qgd	-	12.2	-		
*$t_{d(ON)}$	-	21.6	-	ns	V_{DS}=325V, I_D=6A, V_{GS}=10V, R_G=25Ω
*tr	-	63.6	-		
*$t_{d(OFF)}$	-	54	-		
*t_f	-	27.6	-		

Ciss	-	891	-	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Coss	-	80	-		
Crss	-	9	-		
Rg	-	3	-	Ω	f=1MHz
Source-Drain Diode					
*I_S	-	-	6	A	
*I_{SM}	-	-	24		
*V_{SD}	-	0.82	1.5	V	I_S=6A, V_{GS}=0V
*trr	-	370	-	ns	V_{GS}=0V, I_F=6A, dI_F/dt=100A/μs
*Qrr	-	2.15	-	μC	

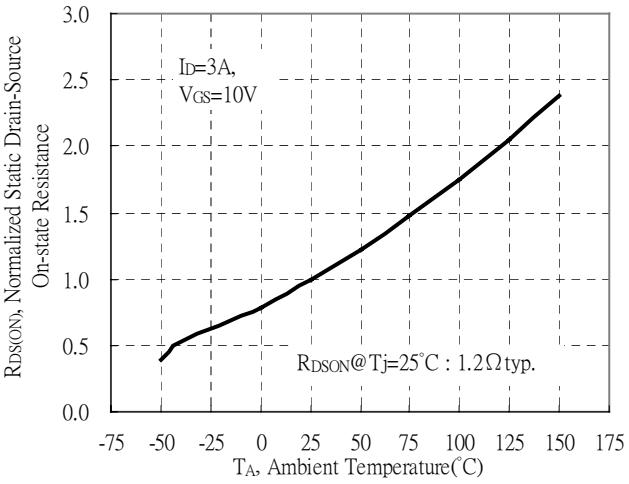
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Typical Characteristics

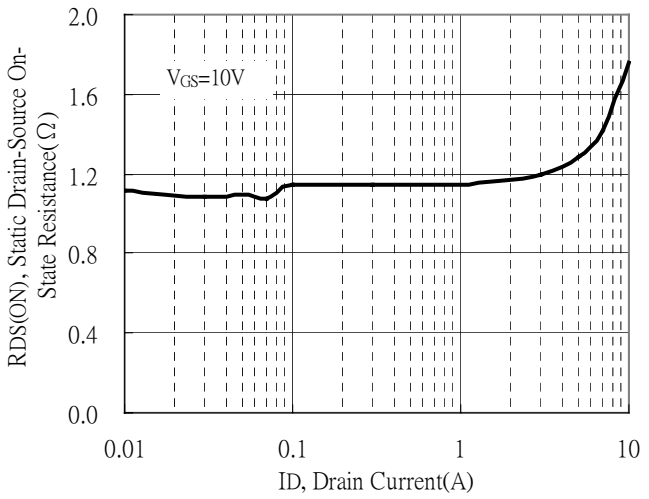
Typical Output Characteristics



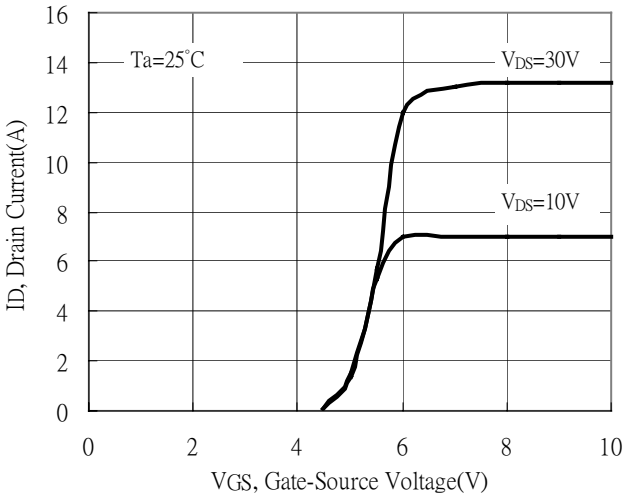
Static Drain-Source On-resistance vs Ambient Temperature



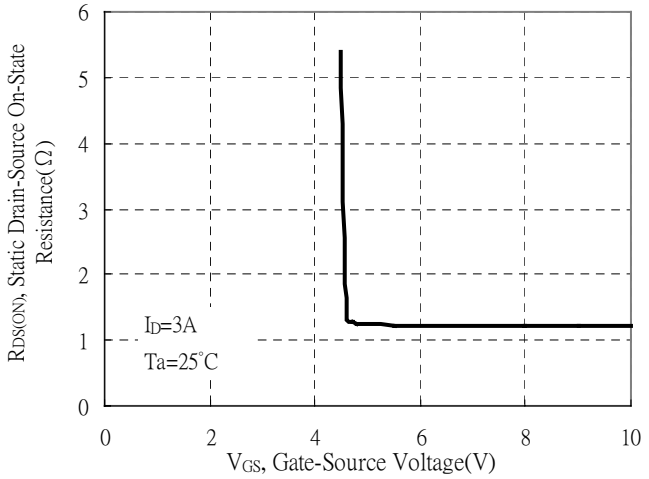
Static Drain-Source On-State resistance vs Drain Current



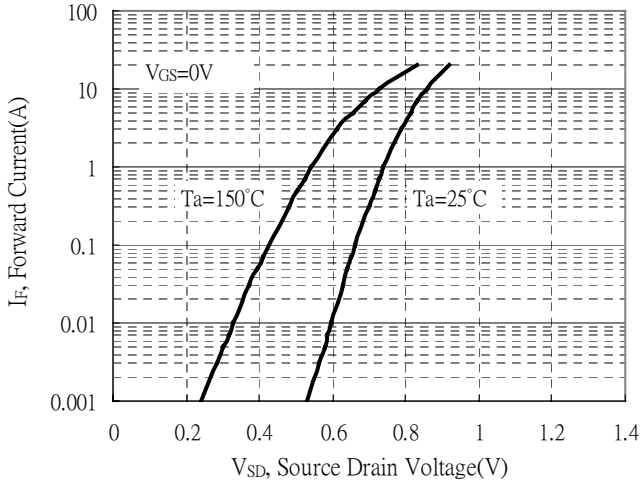
Drain Current vs Gate-Source Voltage



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

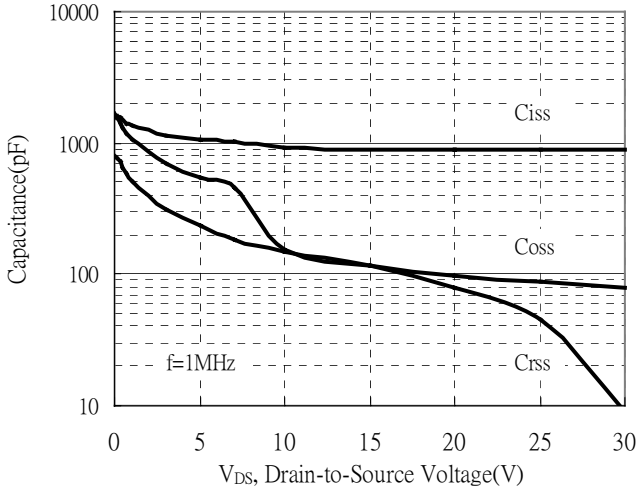


Forward Drain Current vs Source-Drain Voltage

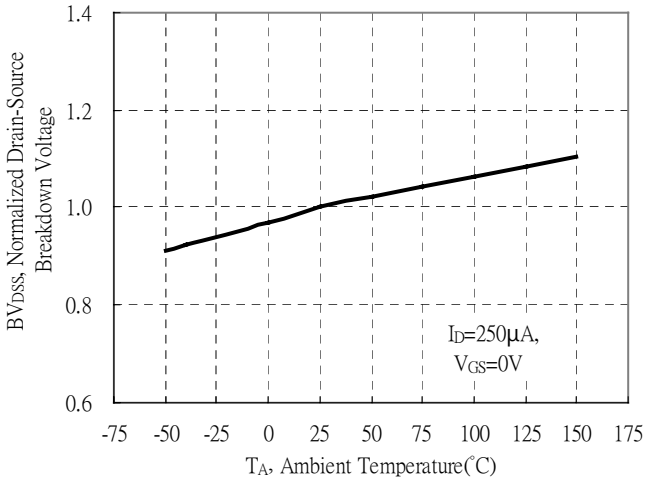


Typical Characteristics(Cont.)

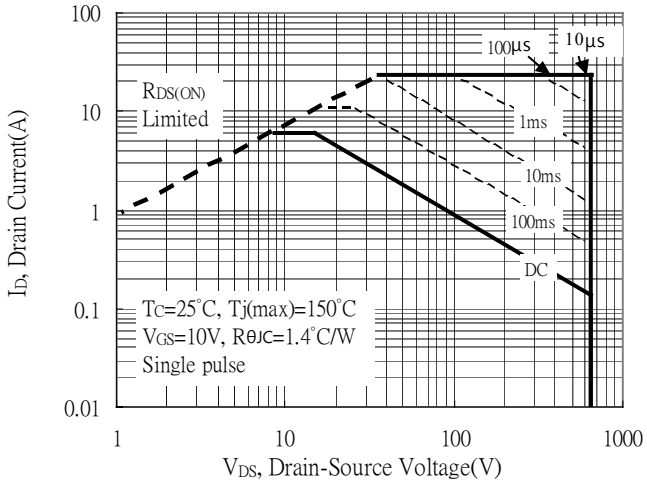
Capacitance vs Reverse Voltage



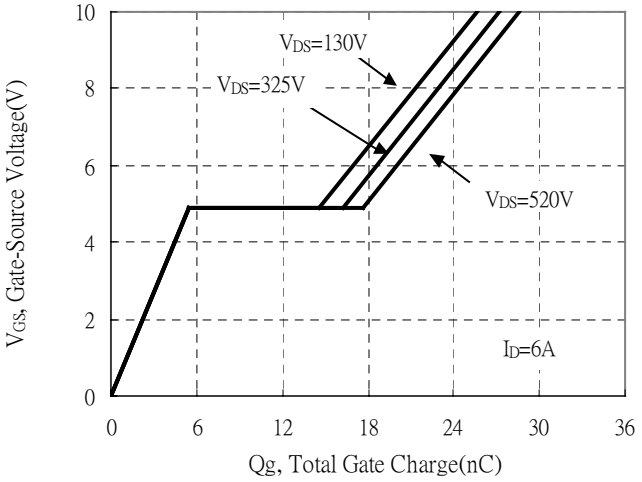
Brekdown Voltage vs Ambient Temperature



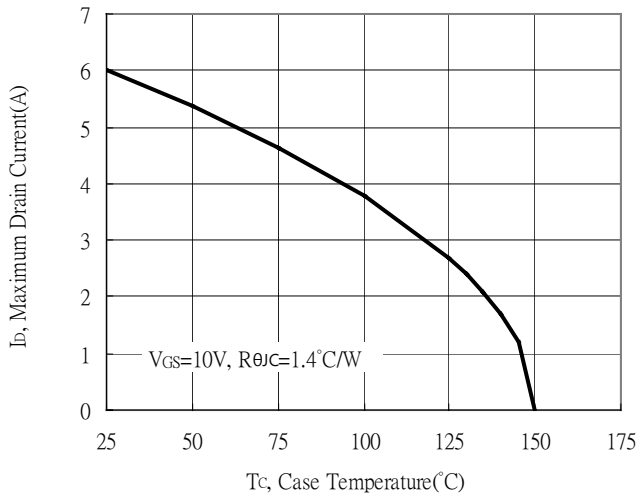
Maximum Safe Operating Area



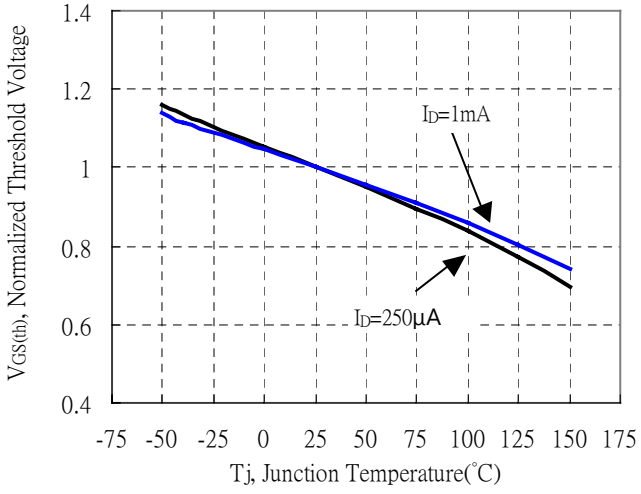
Gate Charge Characteristics



Maximum Drain Current vs Case Temperature

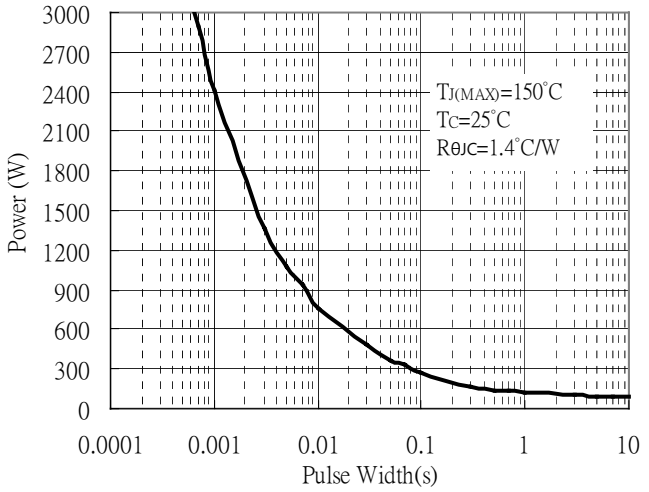


Threshold Voltage vs Junction Tempearture

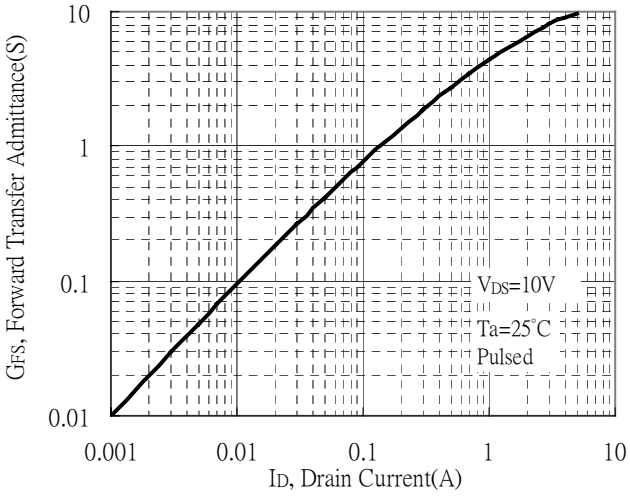


Typical Characteristics(Cont.)

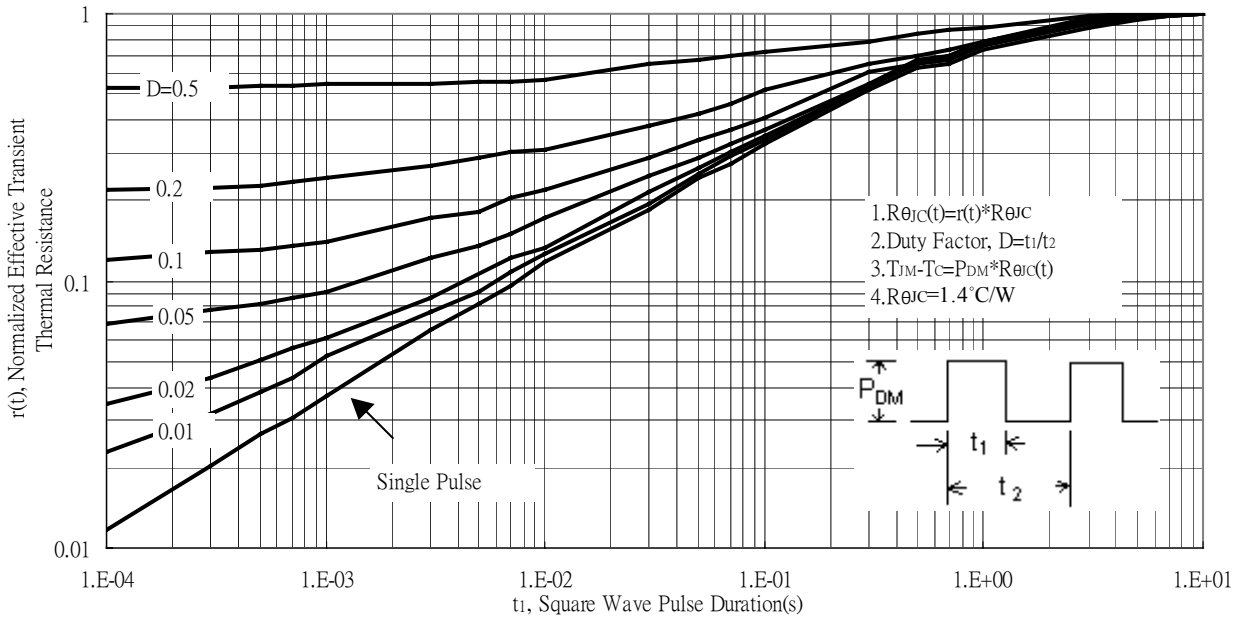
Single Pulse Power Rating, Junction to Case



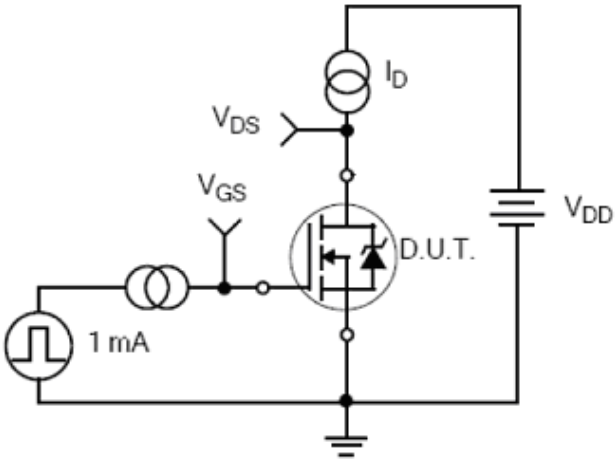
Forward Transfer Admittance vs Drain Current



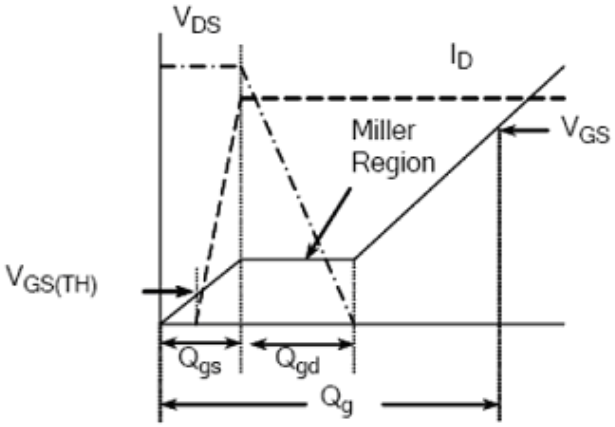
Transient Thermal Response Curves



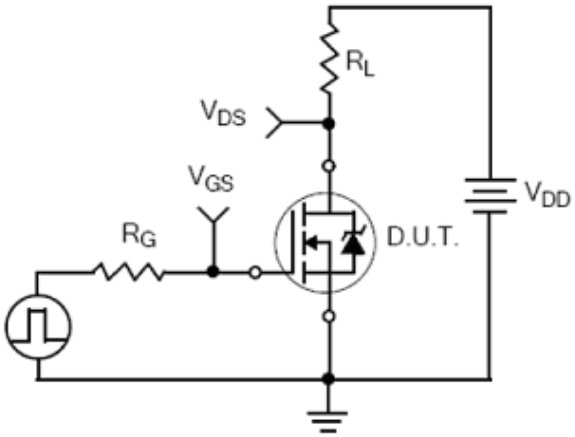
Test Circuit and Waveforms



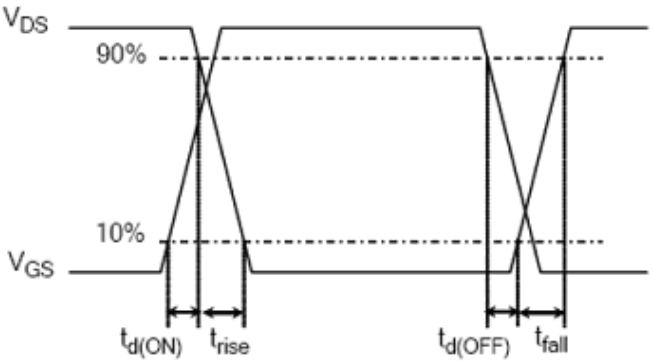
Gate Charge Test Circuit



Gate Charge Waveform

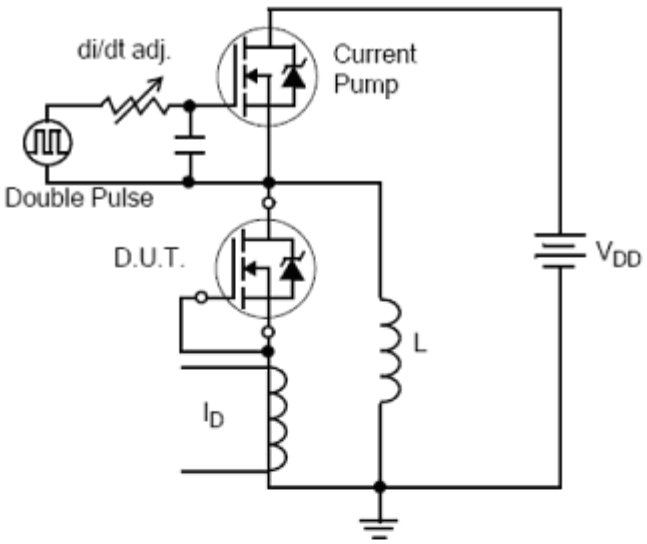


Resistive Switching Test Circuit

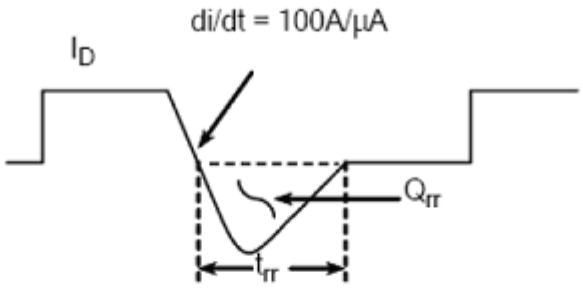


Resistive Switching Waveforms

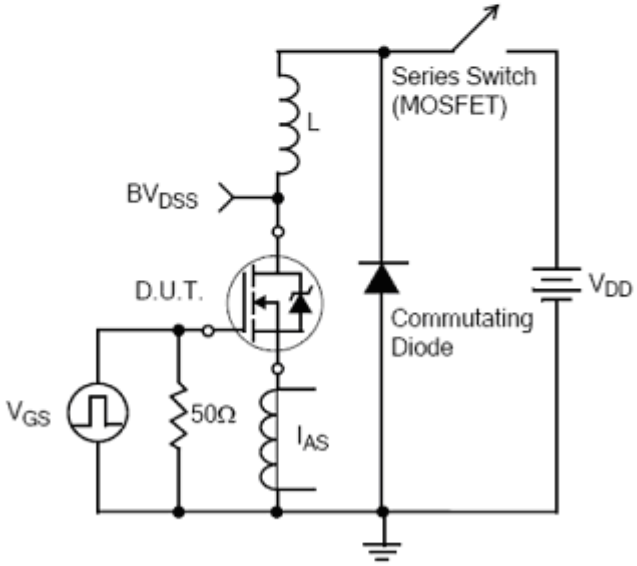
Test Circuit and Waveforms(Cont.)



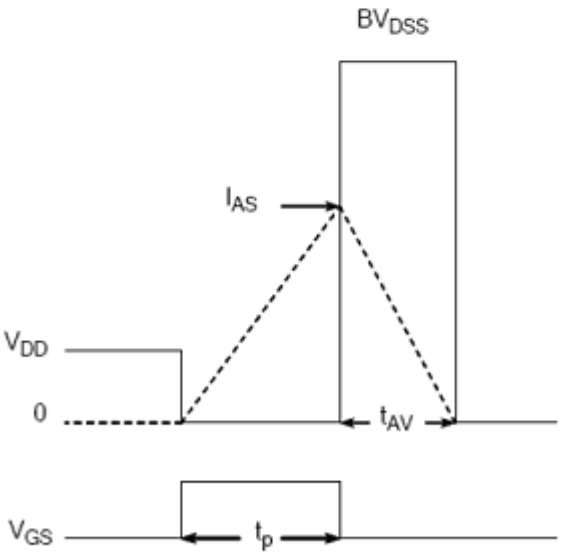
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit



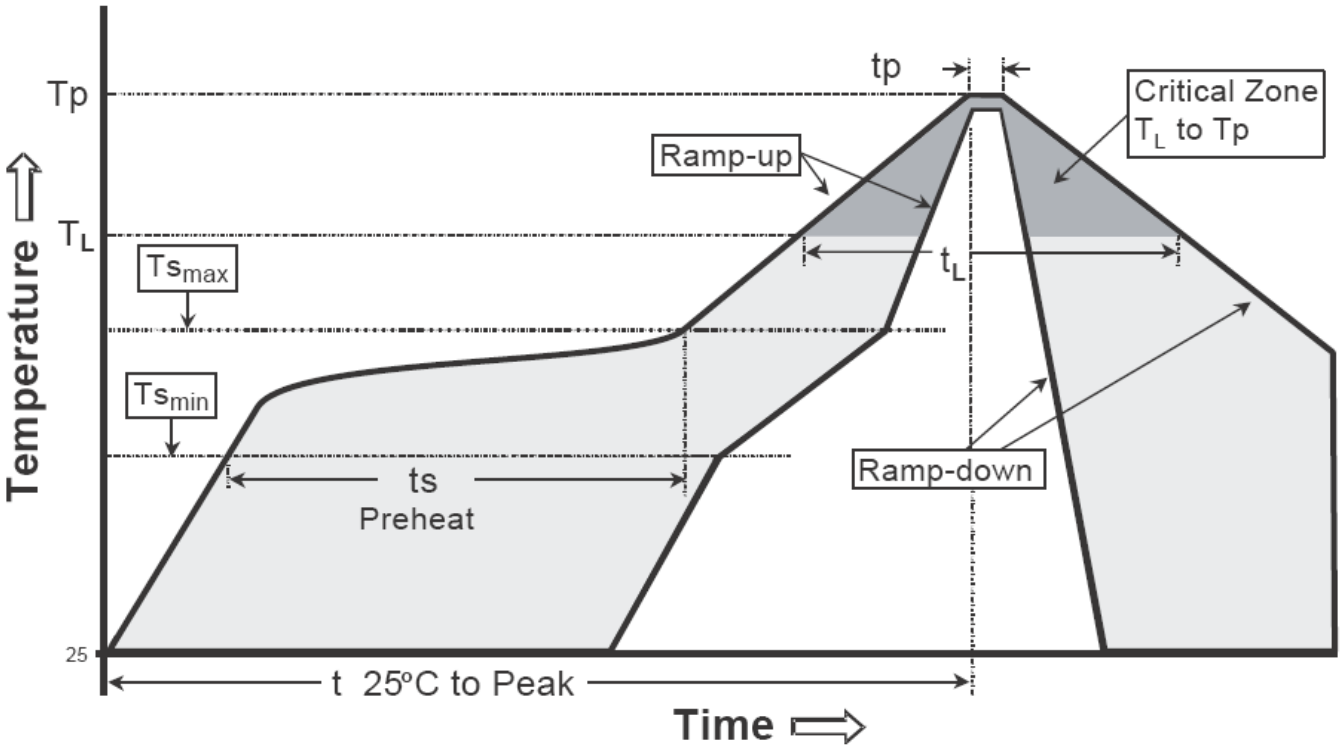
$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Unclamped Inductive Switching Waveforms

Recommended wave soldering condition

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

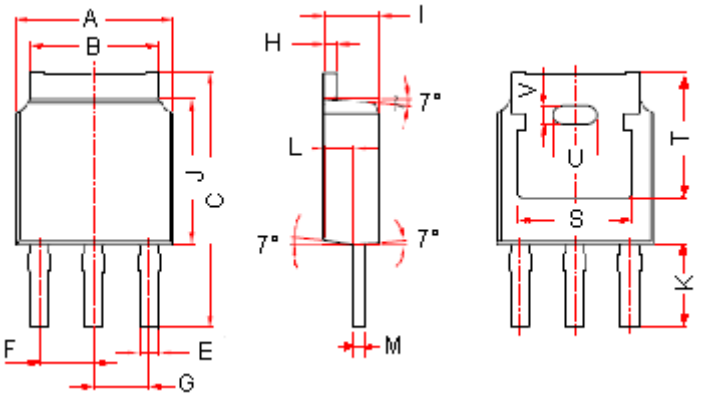
Recommended temperature profile for IR reflow



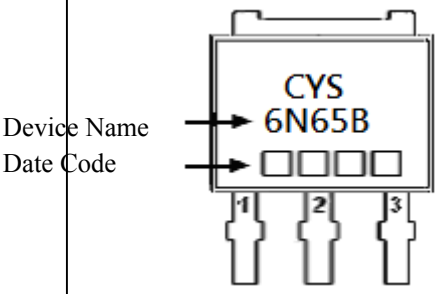
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	 183°C 60-150 seconds	 217°C 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.

TO-251S Dimension



Marking :



3-Lead TO-251S Plastic Package
CYStek Package Code: I3

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

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.2559	0.2638	6.50	6.70	J	0.2362	0.2441	6.00	6.20
B	0.2020	0.2126	5.13	5.46	K	0.1299	0.1457	3.30	3.70
C	0.4094	0.4331	10.40	11.00	L	0.0358	0.0437	0.91	1.11
E	0.0280	0.0319	0.71	0.81	M	0.0181	0.0220	0.46	0.56
F	0.0858	0.0941	2.18	2.39	S	0.1902 REF		4.83 REF	
G	0.0858	0.0941	2.18	2.39	T	0.2106 REF		5.35 REF	
H	0.0181	0.0220	0.46	0.56	U	0.0701 REF		1.78 REF	
I	0.0902	0.0937	2.29	2.38	V	0.0299 REF		0.76 REF	

Notes: 1.Controlling dimension: inch.
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