

**N-Channel Enhancement Mode Power MOSFET****MTN1N65I3** **$BV_{DSS} : 700V @ T_j=150^{\circ}C$**  **$R_{DS(ON)} : 9.5 \Omega$**  **$I_D : 1.0A$** **Description**

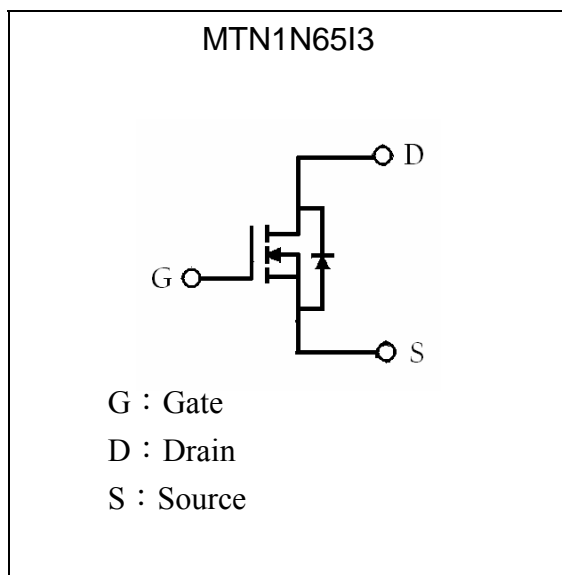
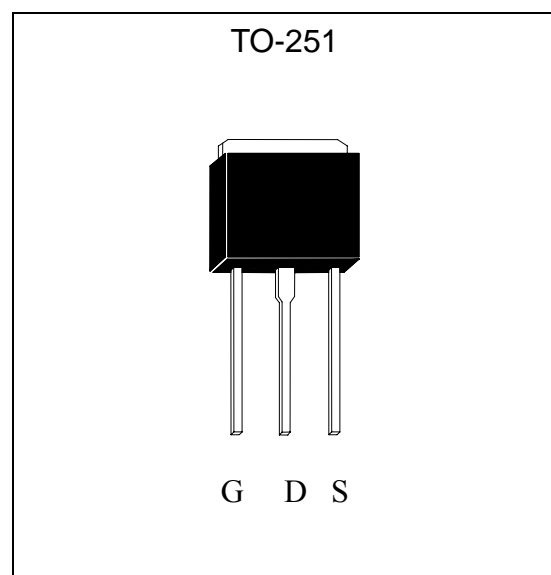
The MTN1N65I3 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-251 package is universally preferred for all commercial-industrial applications

**Features**

- $BV_{DSS}=700V$  typically @  $T_j=150^{\circ}C$
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

**Applications**

- Cell phone charger
- Standby power

**Symbol****Outline**

**Absolute Maximum Ratings** ( $T_C=25^\circ\text{C}$ )

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	1.0	A
Continuous Drain Current @ $T_C=100^\circ\text{C}$	$I_D$	0.6	A
Pulsed Drain Current @ $V_{GS}=10\text{V}$ (Note 1)	$I_{DM}$	4.0	A
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	43	mJ
Avalanche Current (Note 1)	$I_{AR}$	1.0	A
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	2.8	mJ
Peak Diode Recovery $dv/dt$ (Note 3)	$dv/dt$	4.5	V/ns
Maximum Temperature for Soldering @ Lead at 0.125 in(0.318mm) from case for 10 seconds	$T_L$	300	$^\circ\text{C}$
Total Power Dissipation ( $T_A=25^\circ\text{C}$ )	$P_D$	1.5	W
Total Power Dissipation ( $T_C=25^\circ\text{C}$ )		28	W
Linear Derating Factor		0.2	W/ $^\circ\text{C}$
Operating Junction and Storage Temperature	$T_j, T_{stg}$	-55~+150	$^\circ\text{C}$

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

2.  $I_{AS}=1.0\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $L=80\text{mH}$ ,  $R_G=25\ \Omega$ , starting  $T_J=+25^\circ\text{C}$ .

3.  $I_{SD}\leq 1.0\text{A}$ ,  $dI/dt\leq 100\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , starting  $T_J=+25^\circ\text{C}$ .

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	4.46	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	83.3	$^\circ\text{C}/\text{W}$



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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
<b>Static</b>					
BV <sub>DSS</sub>	650	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250μA, T <sub>j</sub> =25°C
BV <sub>DSS</sub>	-	700	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250μA, T <sub>j</sub> =150°C
ΔBV <sub>DSS</sub> /ΔT <sub>j</sub>	-	0.5	-	V/°C	Reference to 25°C, I <sub>D</sub> =250μA
BV <sub>DS</sub>	-	700	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =1.0A
V <sub>GS(th)</sub>	2.0	-	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA
*G <sub>FS</sub>	-	5	-	S	V <sub>DS</sub> =15V, I <sub>D</sub> =0.5A
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±30
I <sub>DSS</sub>	-	-	1	μA	V <sub>DS</sub> =650V, V <sub>GS</sub> =0
	-	-	10	μA	V <sub>DS</sub> =520V, V <sub>GS</sub> =0, T <sub>C</sub> =125°C
*R <sub>DS(ON)</sub>	-	-	9.5	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =0.5A
<b>Dynamic</b>					
*Q <sub>g</sub>	-	4.5	6.7	nC	I <sub>D</sub> =1A, V <sub>DD</sub> =300V, V <sub>GS</sub> =10V
*Q <sub>gs</sub>	-	0.9	1.3		
*Q <sub>gd</sub>	-	1.3	1.9		
*t <sub>d(ON)</sub>	-	22.5	-	ns	V <sub>DD</sub> =300V, I <sub>D</sub> =1A, V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω, R <sub>D</sub> =300Ω
*t <sub>r</sub>	-	27	-		
*t <sub>d(OFF)</sub>	-	11.5	-		
*t <sub>f</sub>	-	27	-		
C <sub>iss</sub>	-	150	225	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1MHz
C <sub>oss</sub>	-	20	30		
C <sub>rss</sub>	-	4.3	6.4		
<b>Source-Drain Diode</b>					
*V <sub>SD</sub>	-	-	1.5	V	I <sub>S</sub> =1.0A, V <sub>GS</sub> =0V
*I <sub>S</sub>	-	-	1.0	A	
*I <sub>SM</sub>	-	-	4.0		
*t <sub>rr</sub>	-	160	-	ns	V <sub>GS</sub> =0, I <sub>F</sub> =1A, dI/dt=100A/μs
*Q <sub>rr</sub>	-	0.59	-	μC	

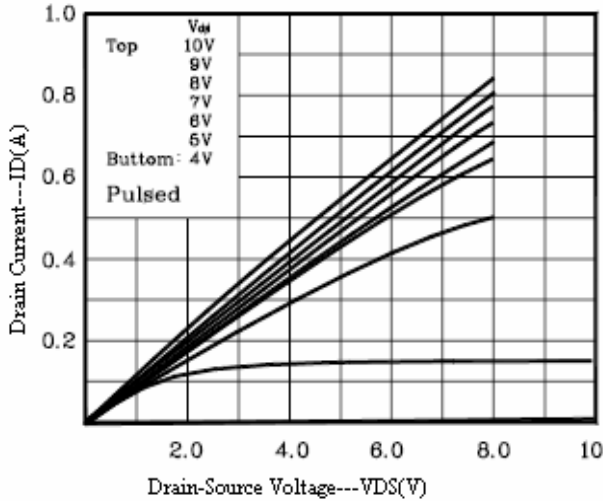
\*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

**Ordering Information**

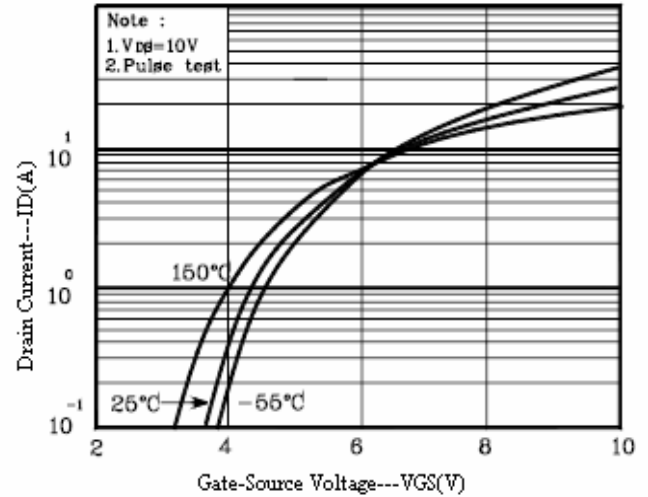
Device	Package	Shipping	Marking
MTN1N65I3	TO-251 (RoHS compliant)	50 pcs / tube, 80 tubes / box	1N65

**Characteristic Curves**

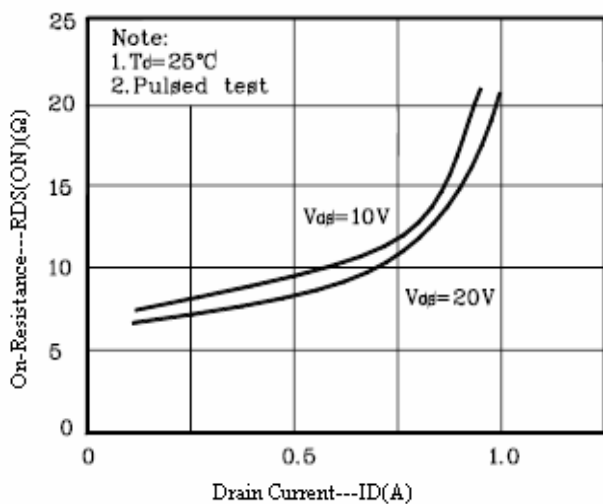
**Figure 1. On-Region Characteristics**



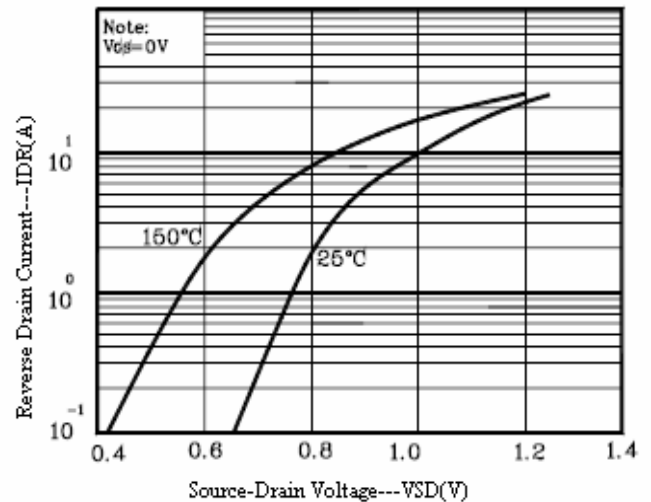
**Figure 2. Transfer Characteristics**



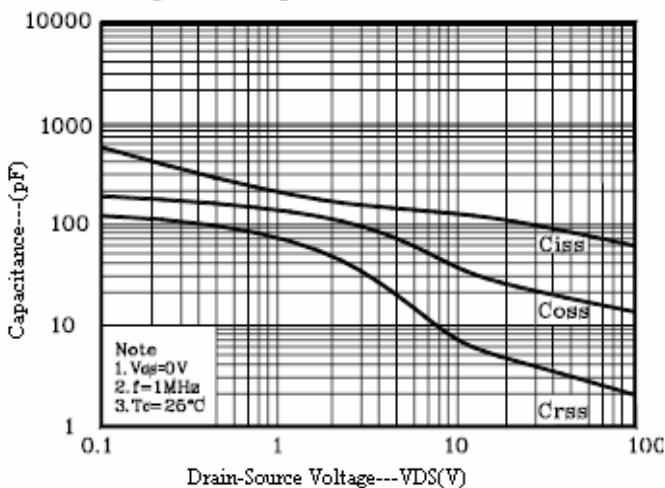
**Figure 3. On-resistance Variation vs. Drain Current and Gate Charge**



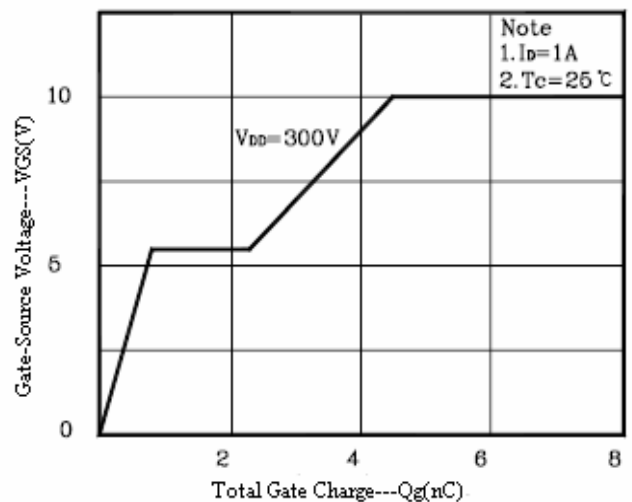
**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**



**Figure 5. Capacitance Characteristics**

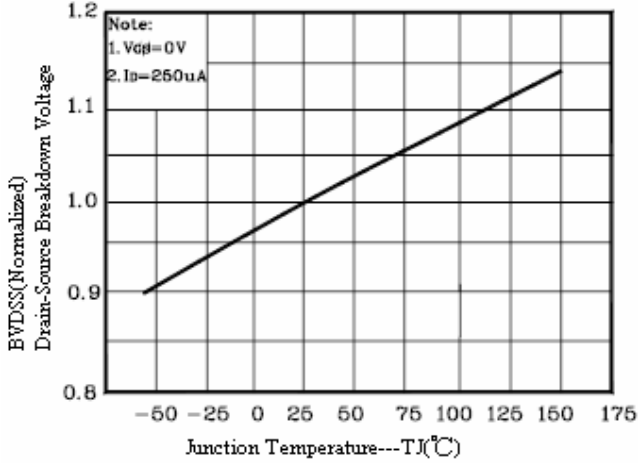


**Figure 6. Gate Charge Characteristics**

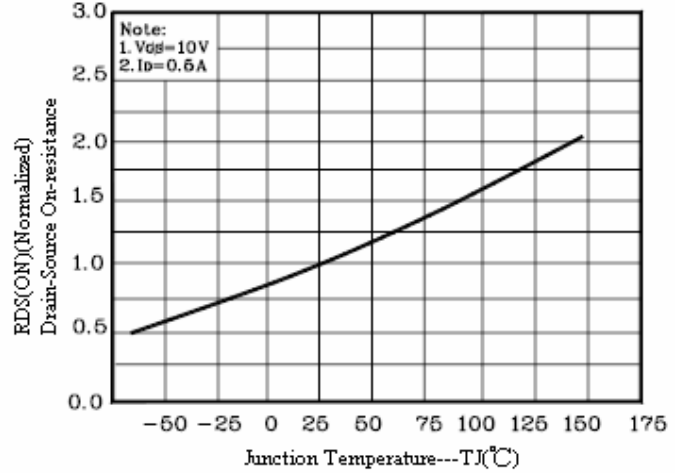


**Characteristic Curves(Cont.)**

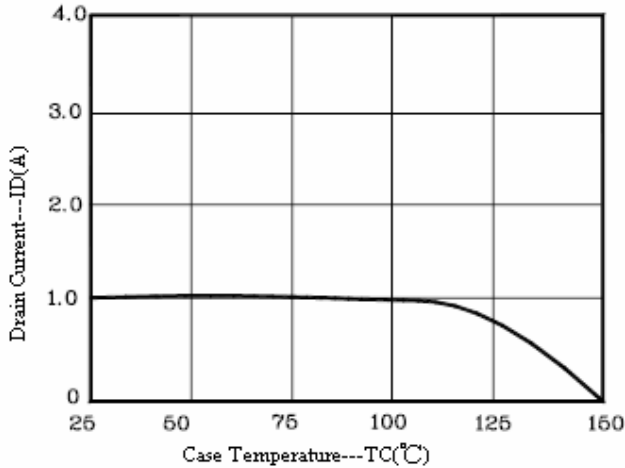
**Figure 7. Breakdown Voltage Variation vs. Temperature**



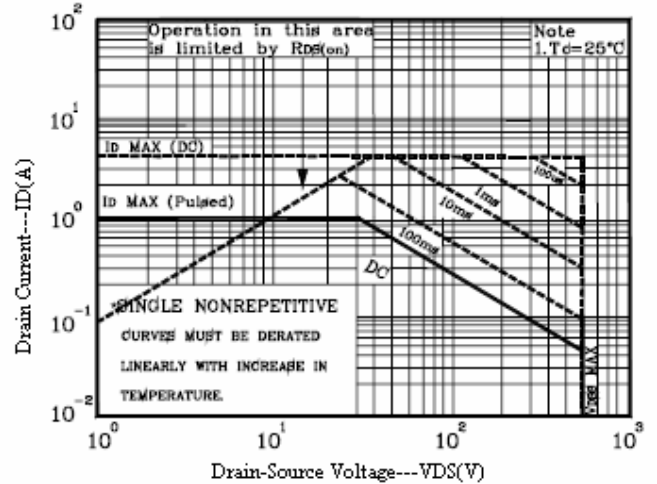
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Drain Current vs. Case Temperature**

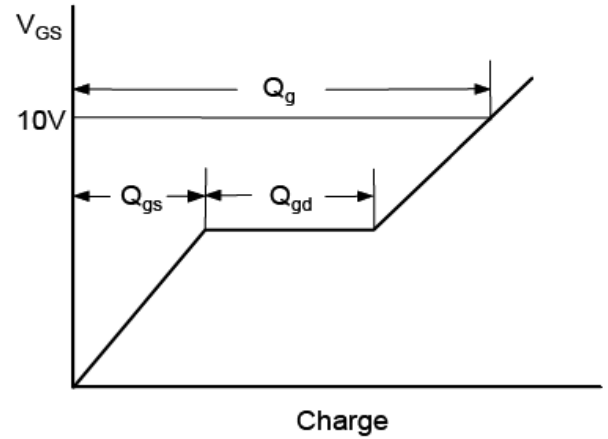
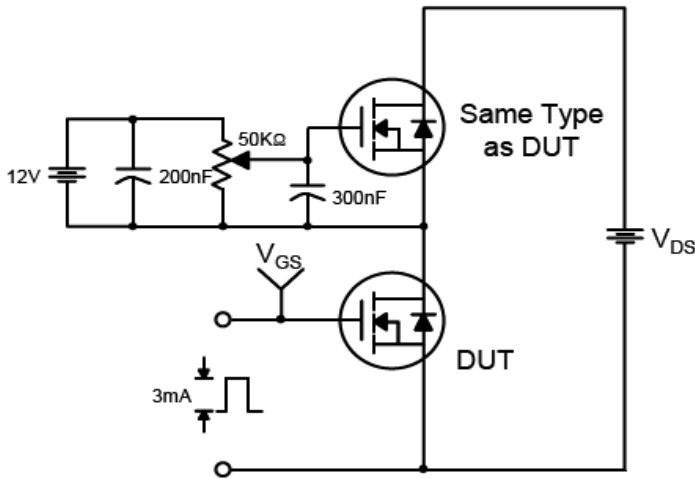


**Figure 10. Maximum Safe Operating Area**

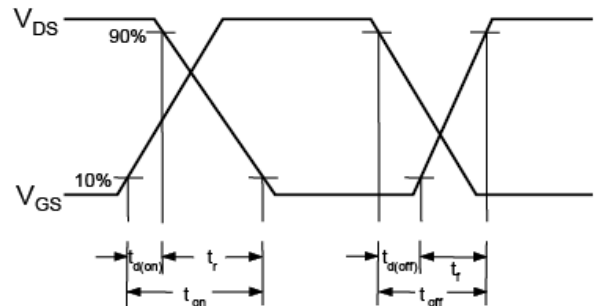
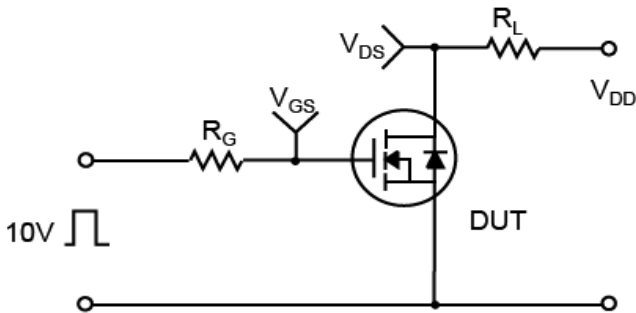


**Test Circuits and Waveforms**

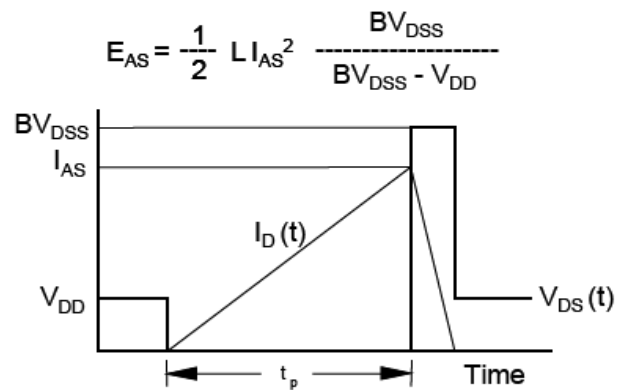
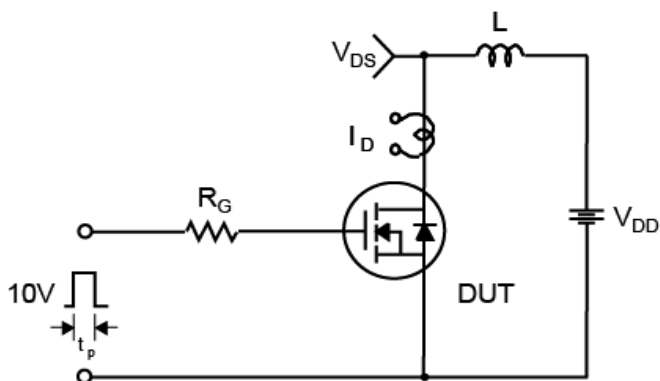
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**

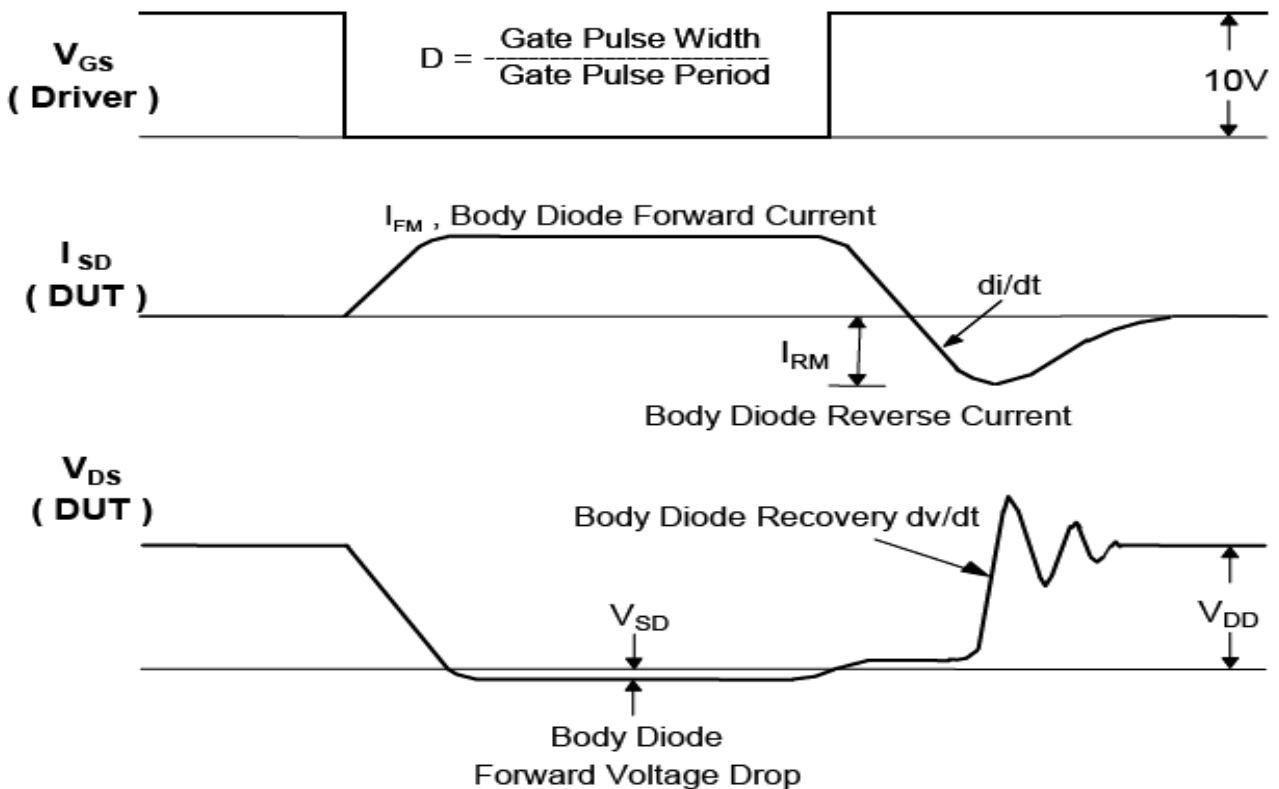
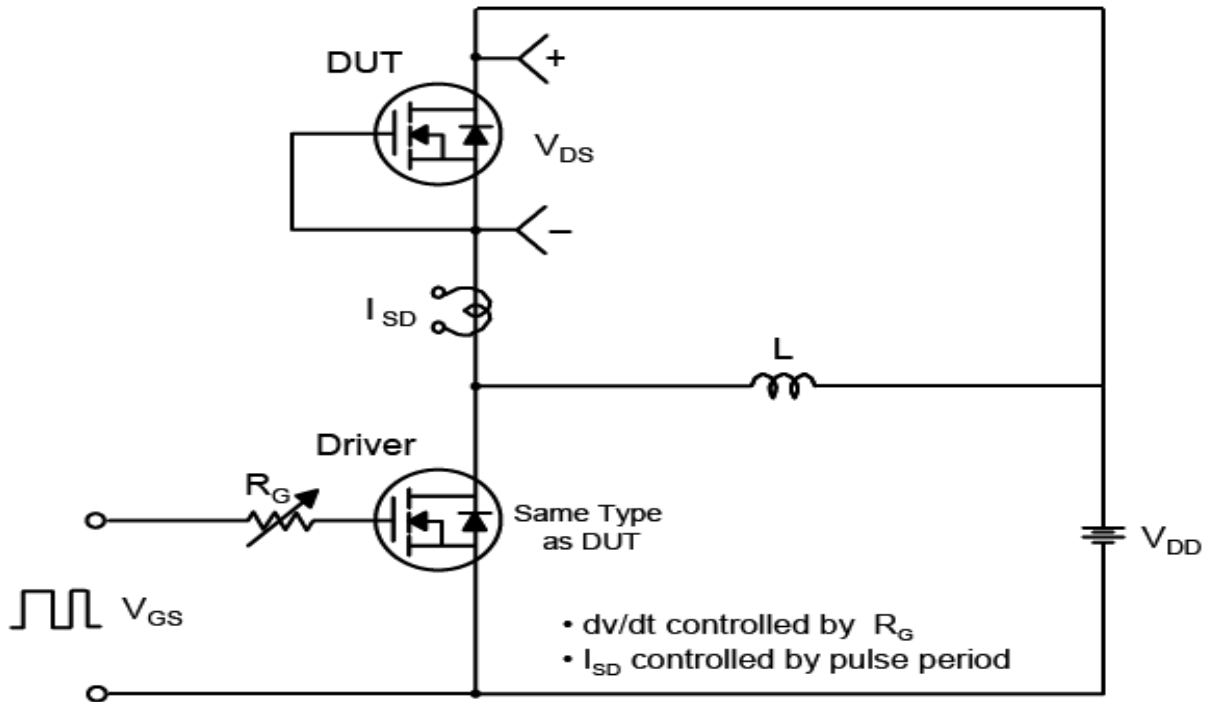


**Unclamped Inductive Switching Test Circuit & Waveforms**

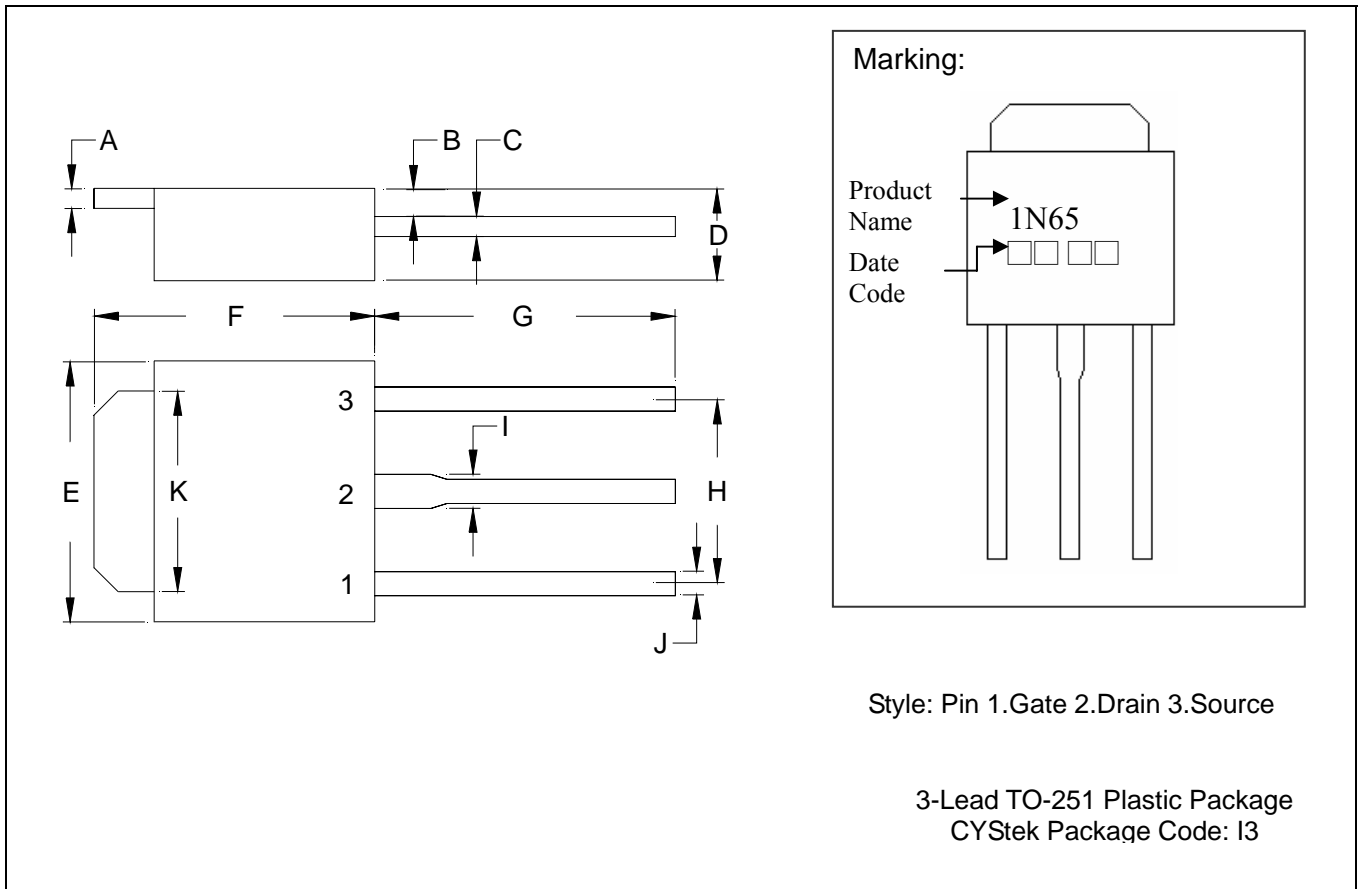


**Test Circuits and Waveforms(Cont.)**

**Peak Diode Recovery dv/dt Test Circuit & Waveforms**



**TO-251 Dimension**



\*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.0177	0.0217	0.45	0.55	G	0.2559	-	6.50	-
B	0.0354	0.0591	0.90	1.50	H	-	*0.1811	-	*4.60
C	0.0177	0.0236	0.45	0.60	I	-	0.0472	-	1.20
D	0.0866	0.0945	2.20	2.40	J	-	0.0346	-	0.88
E	0.2441	0.2677	6.20	6.80	K	0.2047	0.2165	5.20	5.50
F	0.2677	0.2835	6.80	7.20					

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: KFC; pure tin plated
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

**Important Notice:**

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.