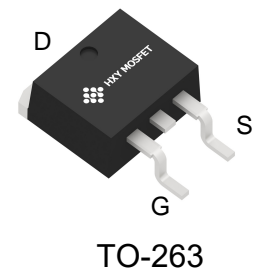




## Description

The 16N65 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



## General Features

$V_{DS} = 650V$   $I_D = 16A$

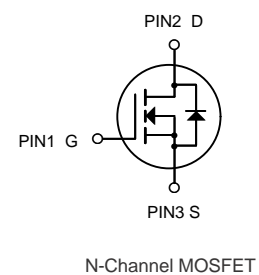
$R_{DS(ON)} < 0.55\Omega @ V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply



## Ordering Information

Product ID	Pack	Brand	Qty(PCS)
16N65	TO-263	HXY MOSFET	800

## Absolute Maximum Ratings

Symbol	Parameter	Limit	Units
$V_{DS}$	Drain-Source Voltage	650	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Drain Current-Continuous	16	A
$I_{DM}$	Drain Current-Pulsed <sup>a</sup>	64	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ C$ - Derate above $25^\circ C$	180	W
		1.1	W/ $^\circ C$
$E_{AS}$	Single Pulsed Avalanche Energy <sup>d</sup>	1000	mJ
$I_{AS}$	Single Pulsed Avalanche Current <sup>d</sup>	64	A
$T_J, T_{stg}$	Operating and Store Temperature Range	-55 to 175	$^\circ C$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.69	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	$^\circ C/W$



**Electrical Characteristics**  $T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$BV_{DSS}$	Drain-to-Source Breakdown Voltage	650	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	1.0	$\mu A$	$V_{DS}=650V, V_{GS}=0V$
		--	--	100		$V_{DS}=520V, V_{GS}=0V,$ $T_J=125^\circ C$
$I_{GSS}$	Gate-to-Source Leakage Current	--	--	+100	$nA$	$V_{GS}=+30V, V_{DS}=0V$
		--	--	-100		$V_{GS}=-30V, V_{DS}=0V$
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance <sup>[4]</sup>	--	0.45	0.55	$\Omega$	$V_{GS}=10V, I_D=8A$
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
$g_{fs}$	Forward Transconductance <sup>[4]</sup>	--	15	--	S	$V_{DS}=15V, I_D=8A$
$C_{iss}$	Input Capacitance	--	2442	--	$pF$	$V_{GS}=0V,$ $V_{DS}=25V,$ $f=1.0MHz$
$C_{rss}$	Reverse Transfer Capacitance	--	18.5	--		
$C_{oss}$	Output Capacitance	--	218	--		
$Q_g$	Total Gate Charge	--	54	--	$nC$	$V_{DD}=325V,$ $I_D=16A, V_{GS}=0$ to 10V
$Q_{gs}$	Gate-to-Source Charge	--	12	--		
$Q_{gd}$	Gate-to-Drain (Miller) Charge	--	21	--		
$t_{d(ON)}$	Turn-on Delay Time	--	15	--	$nS$	$V_{DD}=325V,$ $I_D=16A,$ $V_{GS}=10V$ $R_G=6.1\ \Omega$
$t_{rise}$	Rise Time	--	52	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	59	--		
$t_{fall}$	Fall Time	--	72	--		
$I_{SD}$	Continuous Source Current <sup>[4]</sup>	--	--	16	A	Integral PN-diode in MOSFET
$I_{SM}$	Pulsed Source Current <sup>[4]</sup>	--	--	64		
$V_{SD}$	Diode Forward Voltage	--	--	1.5	V	$I_S=16A, V_{GS}=0V$
$t_{rr}$	Reverse recovery time	--	380	--	V	$V_{GS}=0V, I_F=16A,$ $di_F/dt=100A/\mu s$
$Q_{rr}$	Reverse recovery charge	--	2.6	--	$\mu C$	

**Note:**

[1]  $T_J=+25^\circ C$  to  $+150^\circ C$

[2] Repetitive rating; pulse width limited by maximum junction temperature.

[3]  $I_{SD}=16A, di/dt < 100 A/\mu s, V_{DD} < BV_{DSS}, T_J=+150^\circ C.$

[4] Pulse width  $\leq 380\mu s$ ; duty cycle  $\leq 2\%$ .



### Typical Characteristics

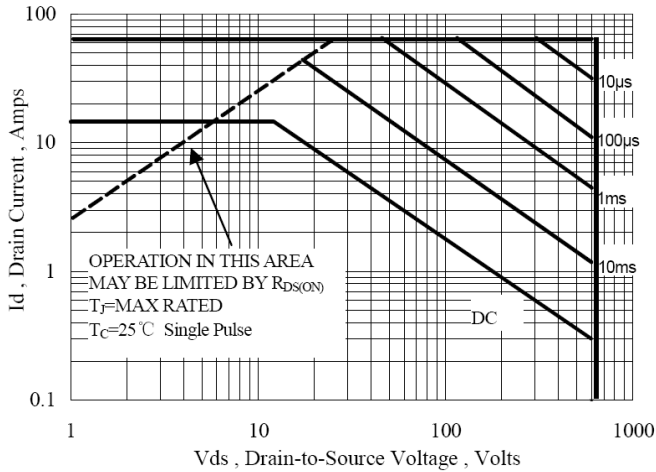


Figure 1 Maximum Forward Bias Safe Operating Area

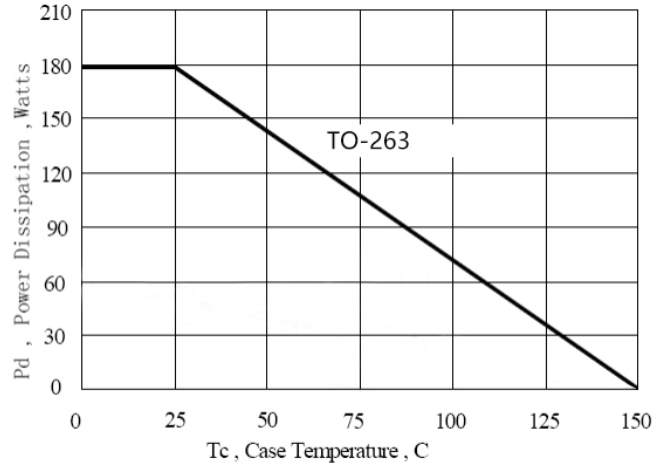


Figure 2 Maximum Power Dissipation vs Case Temperature

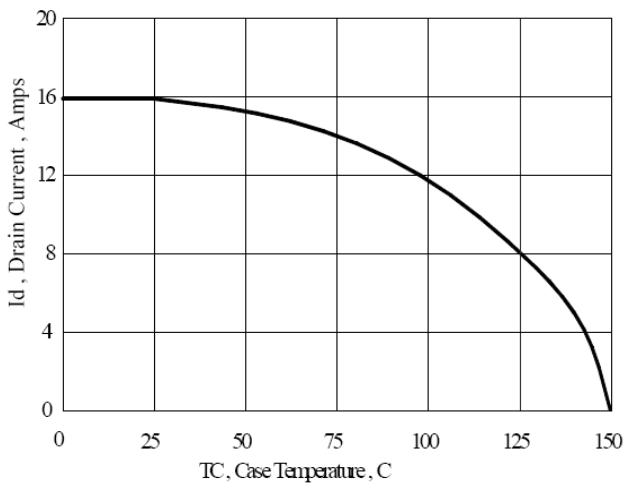


Figure 3 Maximum Continuous Drain Current vs Case Temperature

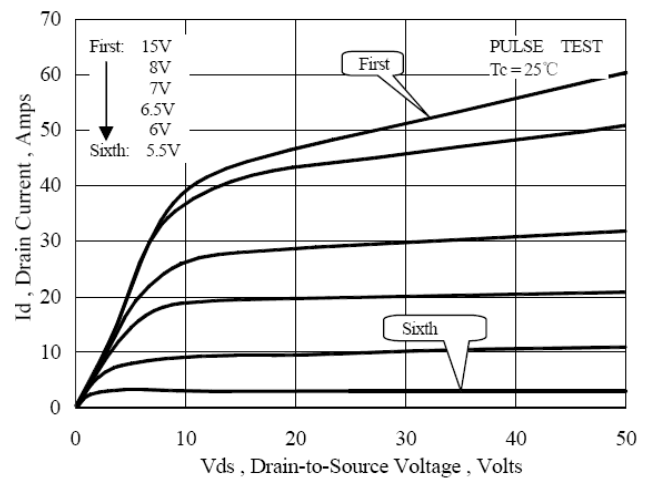


Figure 4 Typical Output Characteristics

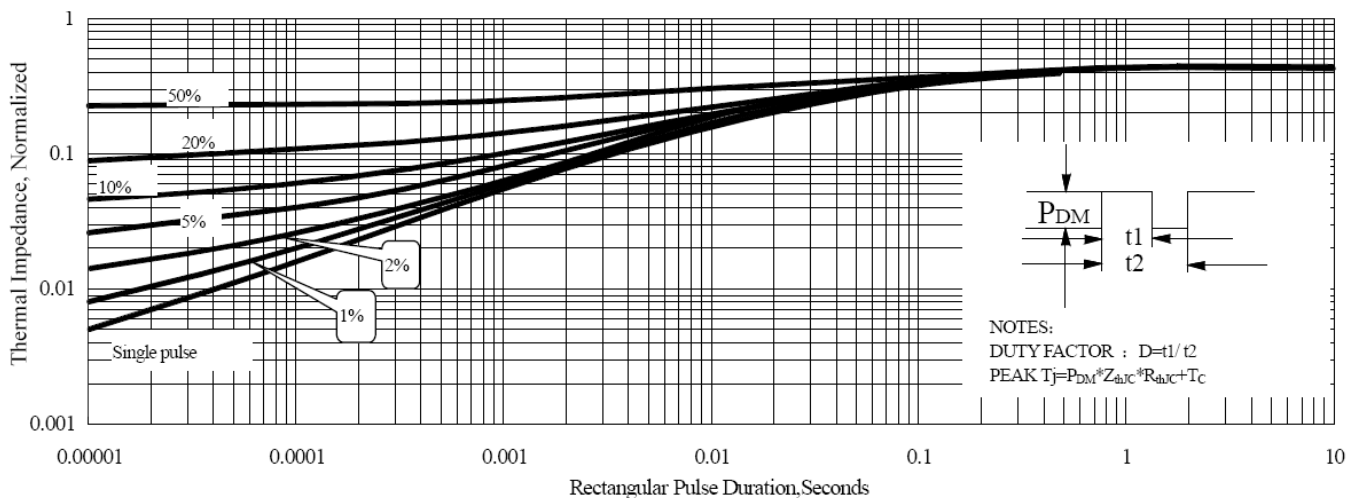
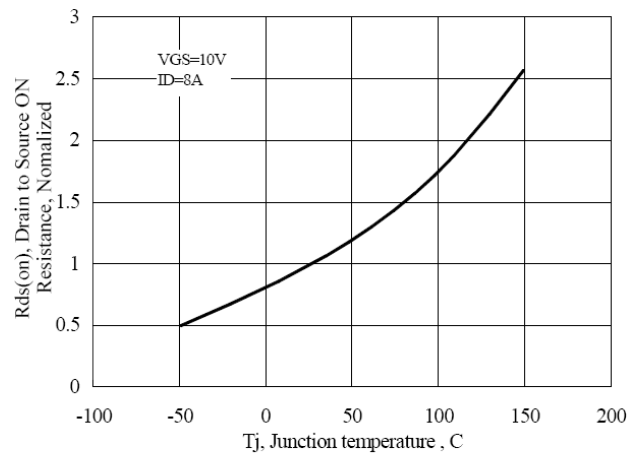
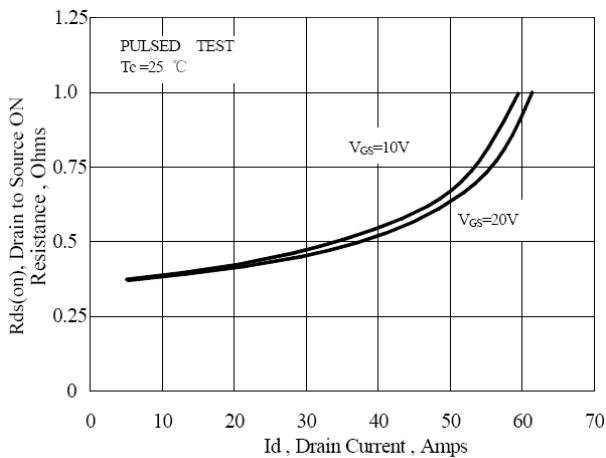
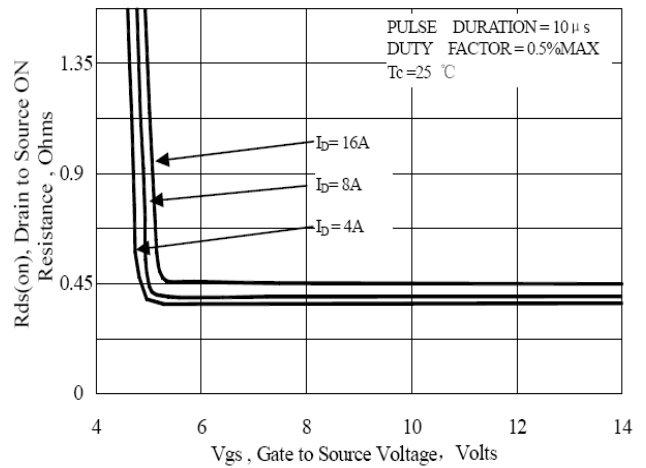
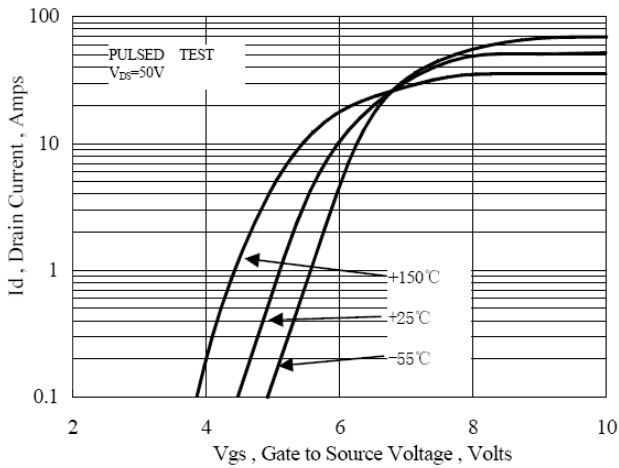
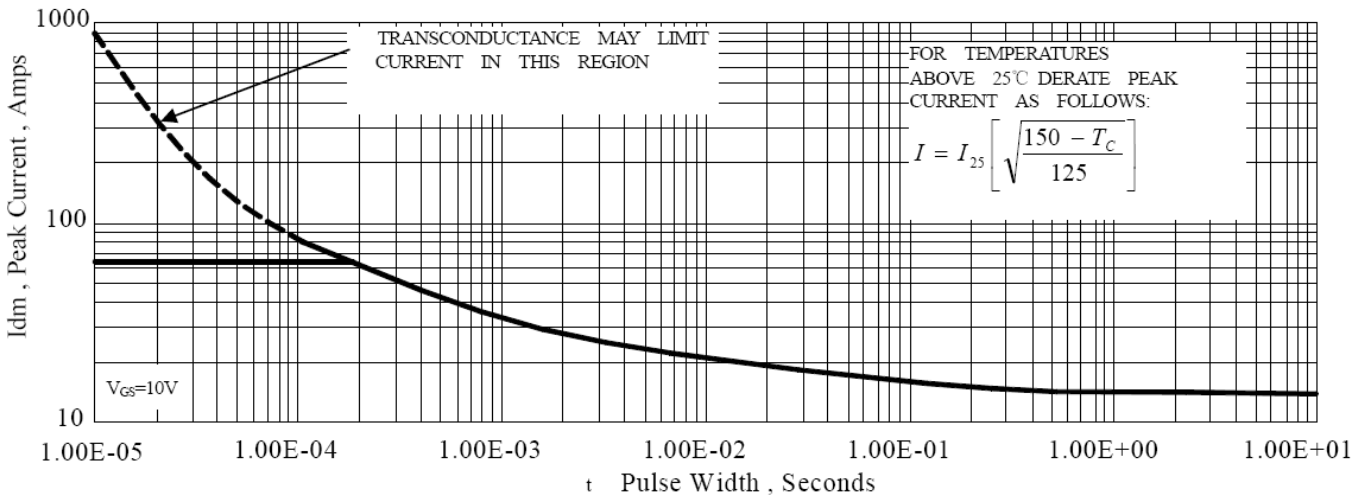


Figure 5 Maximum Effective Thermal Impedance, Junction to Case



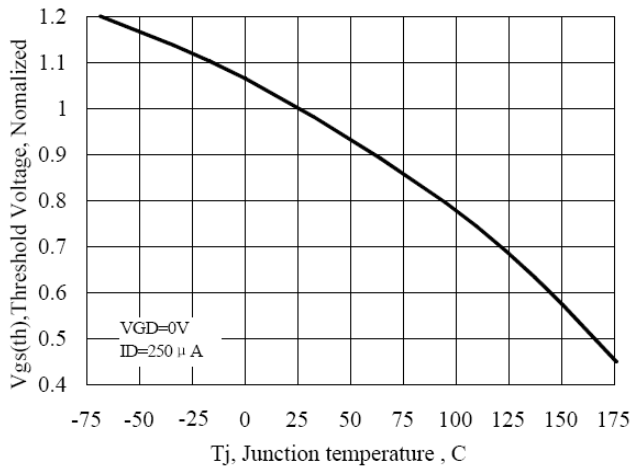


Figure 11 Typical Threshold Voltage vs Junction Temperature

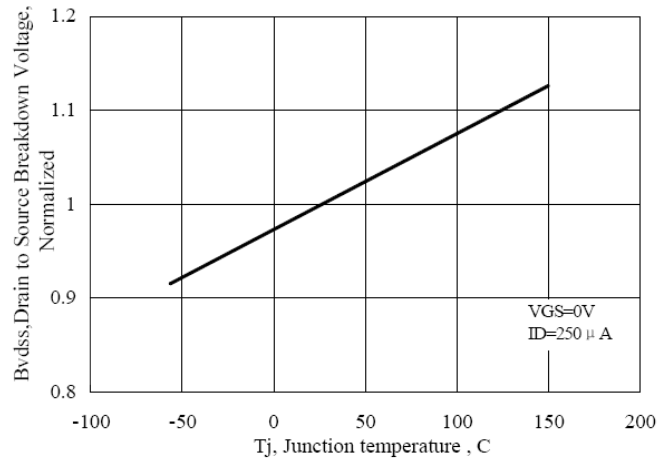


Figure 12 Typical Breakdown Voltage vs Junction Temperature

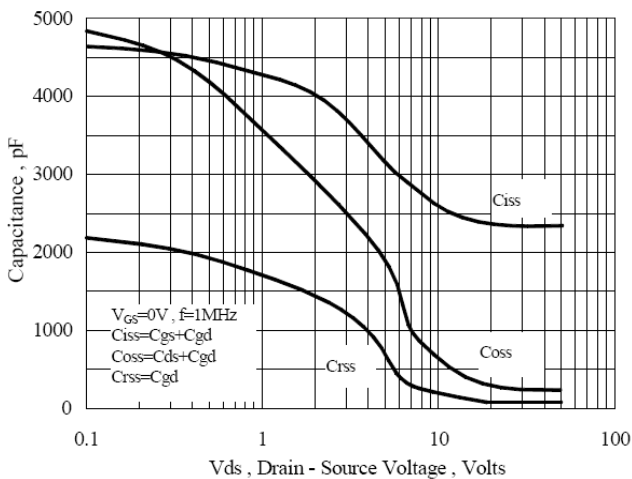


Figure 13 Typical Capacitance vs Drain to Source Voltage

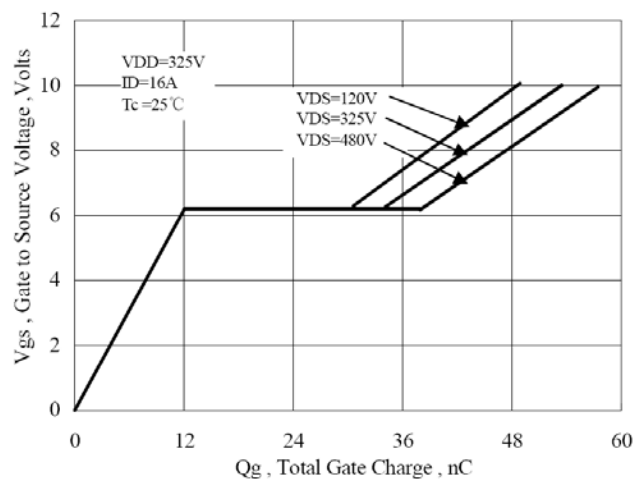


Figure 14 Typical Gate Charge vs Gate to Source Voltage

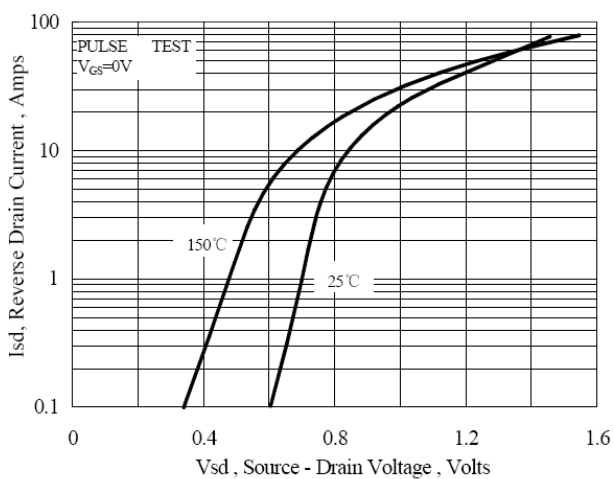


Figure 15 Typical Body Diode Transfer Characteristics

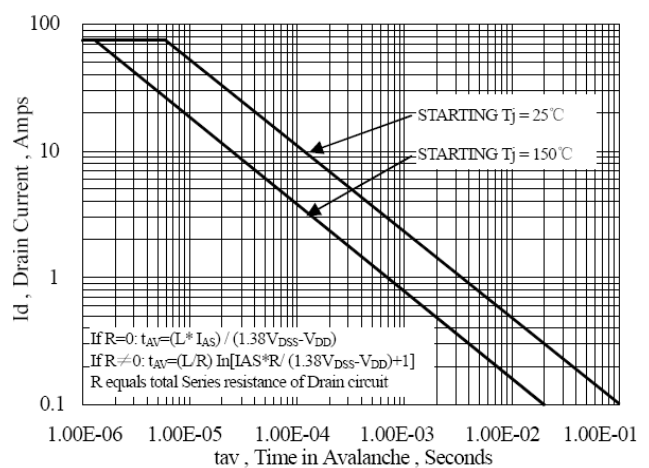


Figure 16 Unclamped Inductive Switching Capability



### Test Circuits and Waveforms

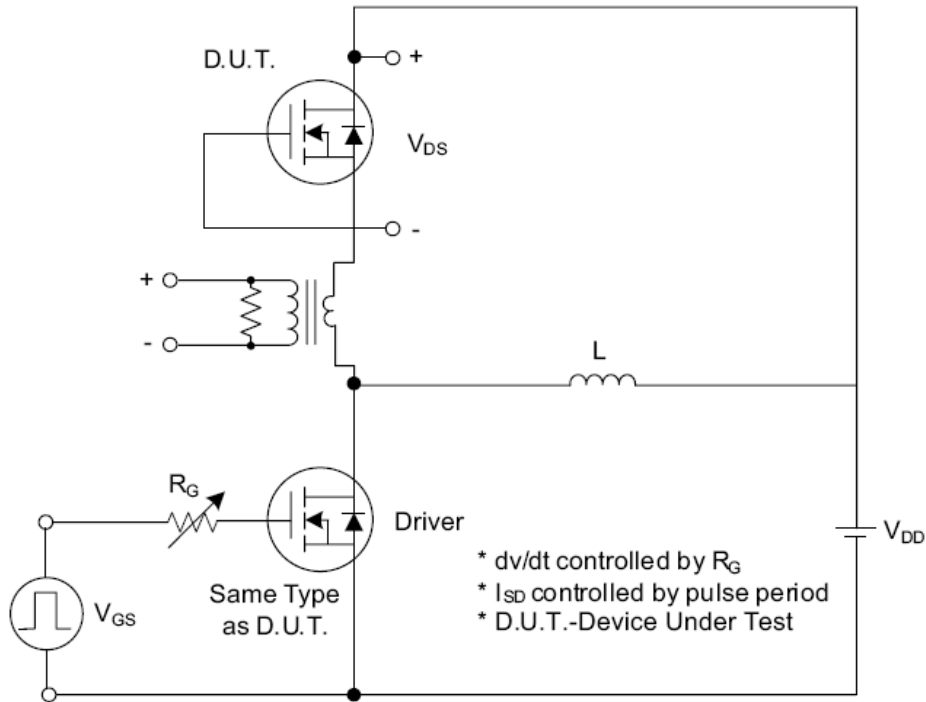


Fig. 1.1 Peak Diode Recovery  $dv/dt$  Test Circuit

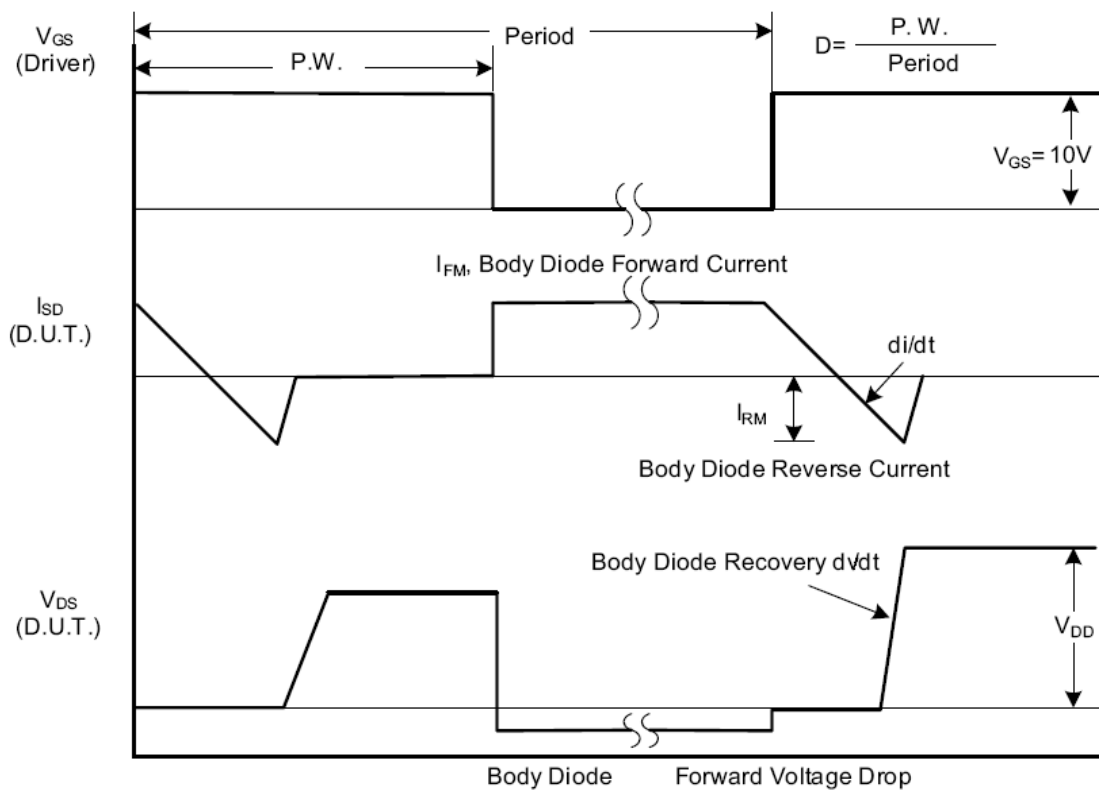


Fig. 1.2 Peak Diode Recovery  $dv/dt$  Waveforms

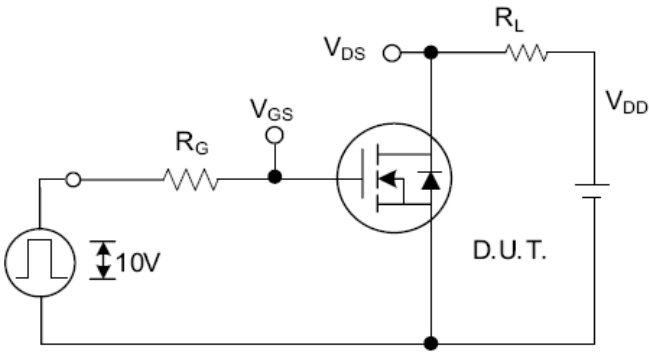


Fig. 2.1 Switching Test Circuit

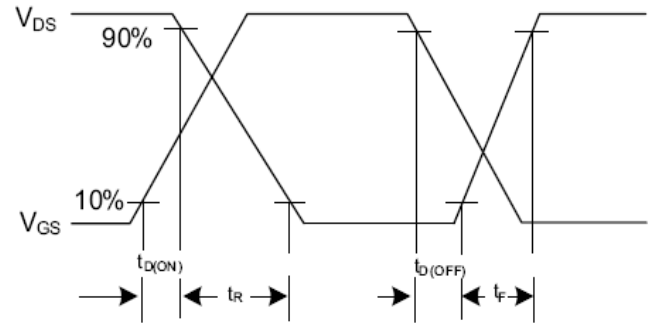


Fig. 2.2 Switching Waveforms

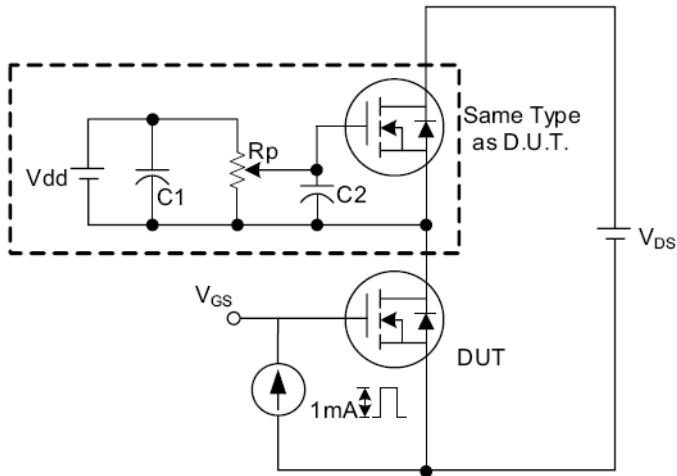


Fig. 3.1 Gate Charge Test Circuit

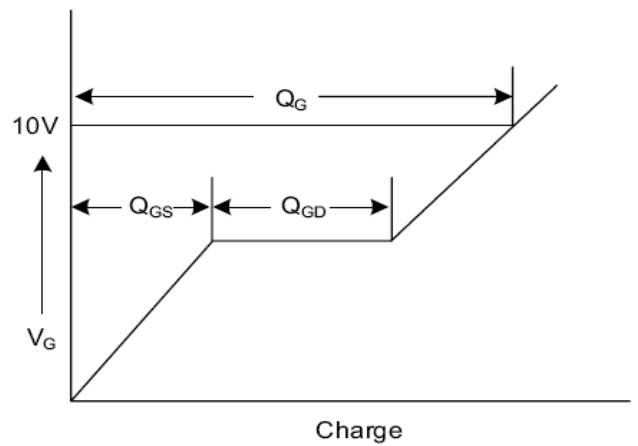


Fig. 3.2 Gate Charge Waveform

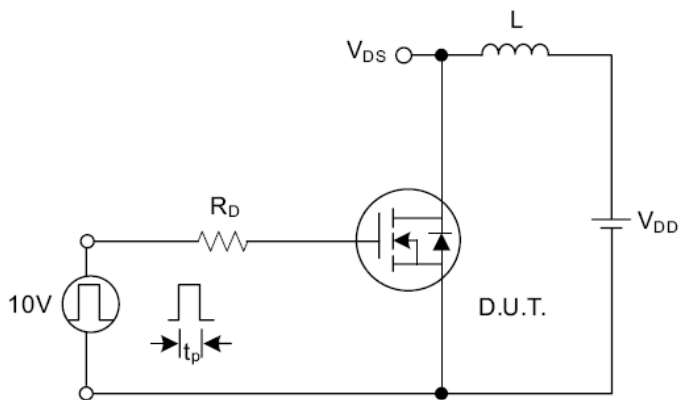


Fig. 4.1 Unclamped Inductive Switching Test Circuit

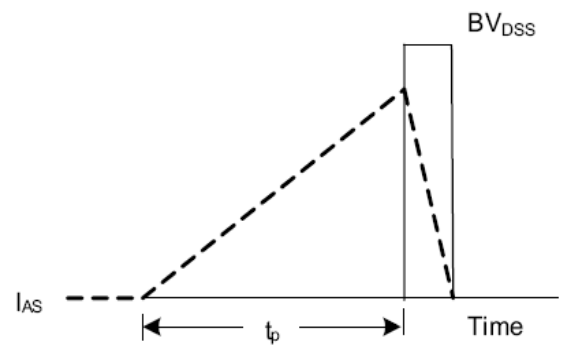
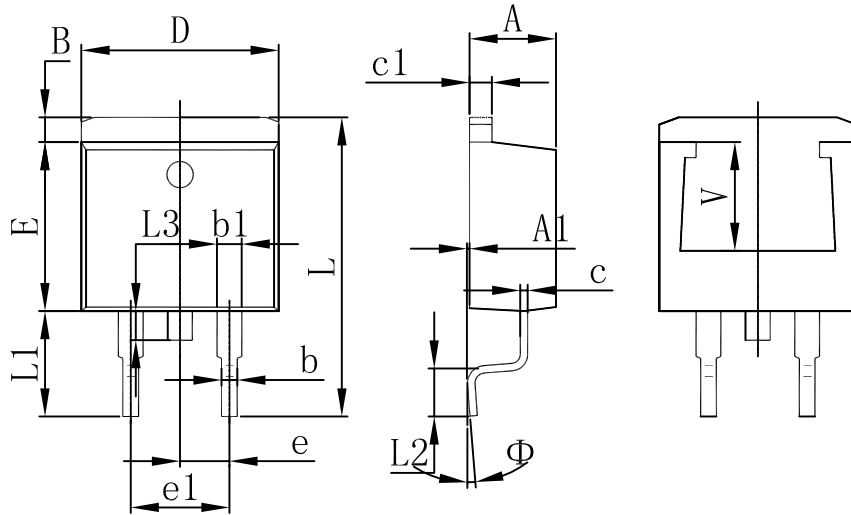


Fig. 4.2 Unclamped Inductive Switching Waveforms



**TO-263 Package Outline Dimensions**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
Φ	0°	8°	0°	8°
V	5.600 REF.		0.220REF.	



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