

16A, 650V N-CHANNEL MOSFET

GENERAL DESCRIPTION

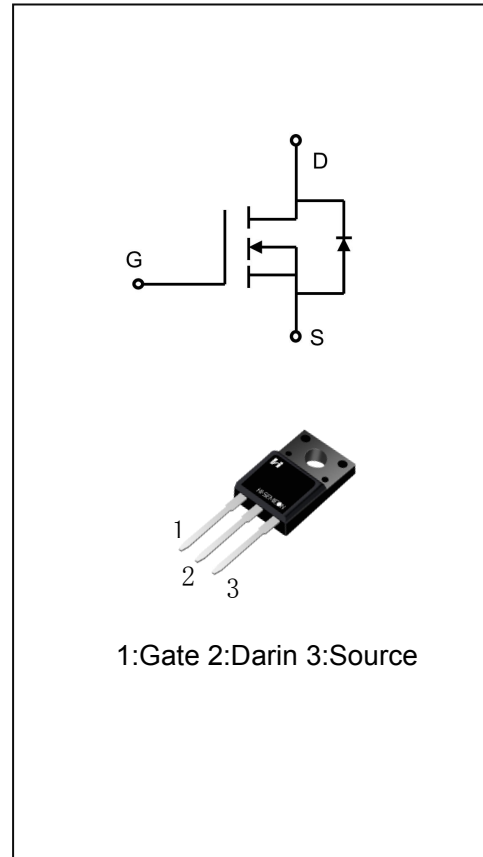
This power mosfet is an N-channel enhancement mode power MOS field effect transistor which is produced using Hi-semicon proprietary F-CellTM structure VDMOS technology. The improved planar stripe cell and the improved guard ring terminal have been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are widely used in AC-DC power suppliers, DC-DC converters and H-bridge PWM motor drivers.

Features

- ◆ $V_{DS}(V)=650V, I_D=16A$
- ◆ $R_{DS(ON)}$
 TYP: $385m\Omega @ V_{GS}=10V, I_D=10A$
 MAX: $500m\Omega$

Applications

- ◆ Power faction correction (PFC)
- ◆ Switched mode power supplies (SMPS)
- ◆ Uninterruptible power supply (UPS)
- ◆ LED lighting power



ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SFF16N65	TO-220F-3L	SFF16N65	Pb Free	Tube

ABSOLUTE MAXIMUM RATINGS (T_J=25°C unless otherwise noted)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V _{DS}	650	V
Gate-Source Voltage		V _{GS}	±30	V
Drain Current	T _C = 25°C	I _D	16	A
	T _C = 100°C		10.8	
Drain Current Pulsed(Note 1)		I _{DM}	64	A
Power Dissipation(T _C =25°C) -Derate above 25°C		P _D	42	W
			0.36	W/°C
Single Pulsed Avalanche Energy (Note 2)		E _{AS}	511	mJ
Operation Junction Temperature Range		T _J	-55~+150	°C
Storage Temperature Range		T _{stg}	-55~+150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		TL	300	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	MAX	Unit
Thermal Resistance, Junction-to-Case	R _{θJC}	3.75	°C/W
Thermal Resistance, Junction-to-Ambient	R _{θJA}	62.5	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain -Source Breakdown Voltage	B _{VDS}	V _{GS} =0V, I _D =250μA	650	703	--	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =650V, V _{GS} =0V	--	1.6	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =30V, V _{DS} =0V	--	4.3	100	nA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =-30V, V _{DS} =0V	--	-0.7	-100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D =250μA	2	3.3	4.0	V
Static Drain- Source On State Resistance	R _{DS(on)}	V _{GS} =10V, I _D =5A	--	372	500	mΩ
		V _{GS} =10V, I _D =10A	--	385	500	mΩ
Dynamic Characteristics						
Gate Resistance	R _g	V _{GS} =0V; f=1.0MHZ	1	2.9	10	Ω
Input Capacitance	C _{iss}	V _{DS} =25V V _{GS} =0V f=1.0MHZ	--	3340	--	pF
Output Capacitance	C _{oss}		--	242.8	--	
Reverse Transfer Capacitance	C _{rss}		--	4.0	--	pF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =250V R _G =10Ω; I _D =10A (Note 3.4)	--	32	--	ns
Turn-on Rise Time	t _r		--	71.3	--	
Turn-off Delay Time	t _{d(off)}		--	72	--	
Turn-off Fall Time	t _f		--	53.6	--	

Total Gate Charge	Q_g	$V_{DS}=600V, I_D=16A$ $V_{GS}=10V$ (Note 3.4)	--	56.5	--	nc
Gate-Source Charge	Q_{gs}		--	11.5	--	
Gate-Drain Charge	Q_{gd}		--	20.3	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction Diode in the MOSFET	--	--	16	A
Pulsed Source Current	I_{SM}		--	--	64	
Diode Forward Voltage	V_{SD}	$I_S=20A, V_{GS}=0V$	--	0.79	1.2	V
Reverse Recovery Time	T_{rr}	$I_F=20A, V_R=520V,$ $dIF/dt=100A/\mu S$	--	566	--	ns
Reverse Recovery Charge	Q_{rr}		--	233	--	μC

1. Pulse width limited by maximum junction temperature
2. $L=10mH, I_{AS}=10A, V_{DD}=80V, V_G=10V, R_G=25\Omega,$ starting $T_J=25^\circ C$
3. Pulse Test: Pulse width $\leq 300\mu s,$ Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

Typical Performance Characteristics

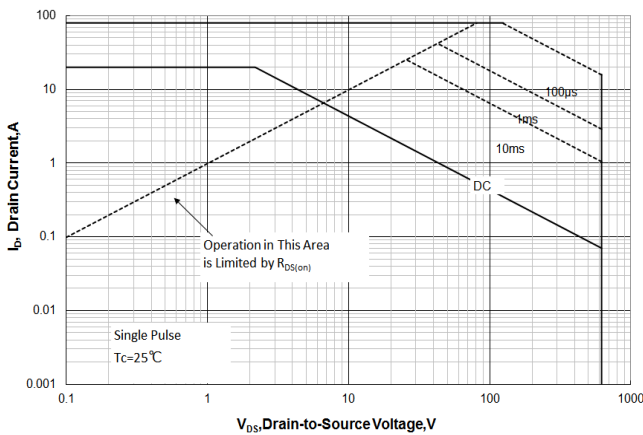


Figure 1 Maximum Forward Bias Safe Operating Area

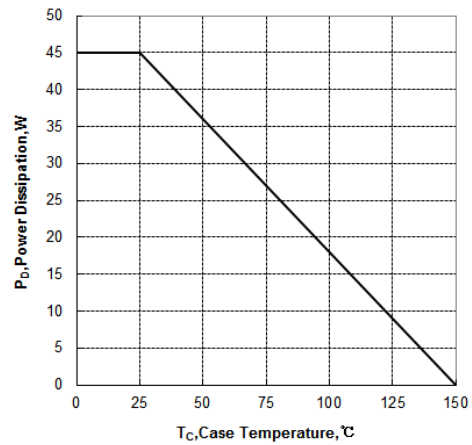


Figure 2 Maximum Power dissipation vs Case Temperature

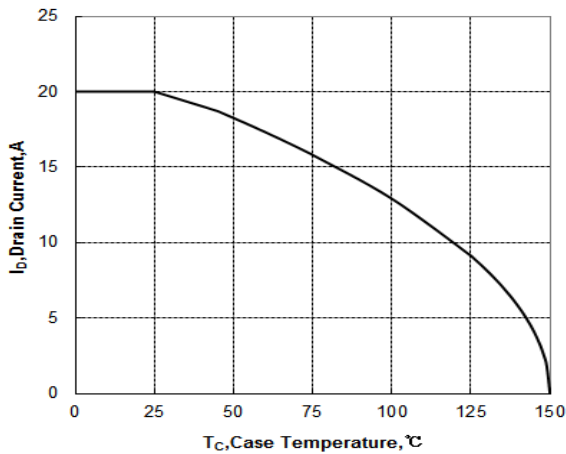


Figure 3 Maximum Continuous Drain Current vs Case Temperature

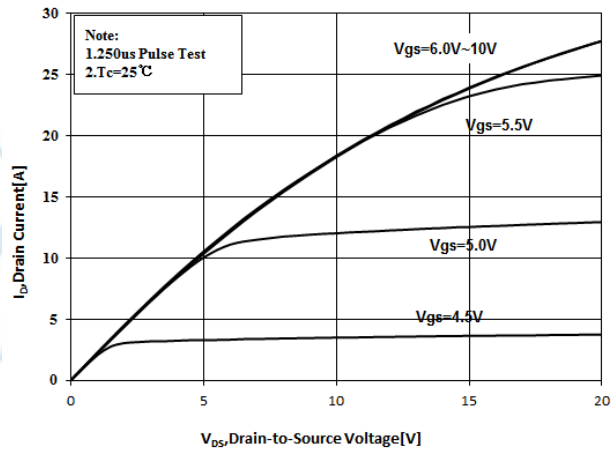


Figure 4 Typical Output Characteristics

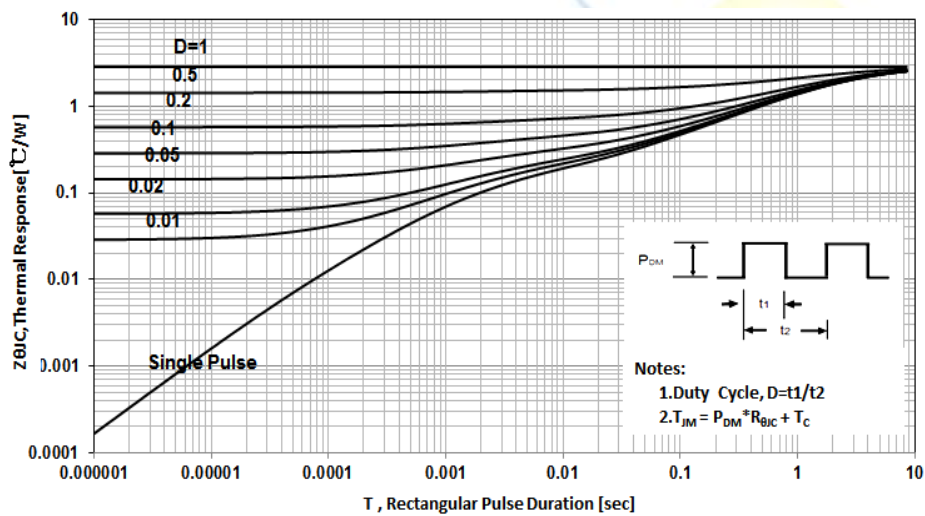


Figure 5 Maximum Effective Thermal Impedance , Junction to Case

Typical Performance Characteristics

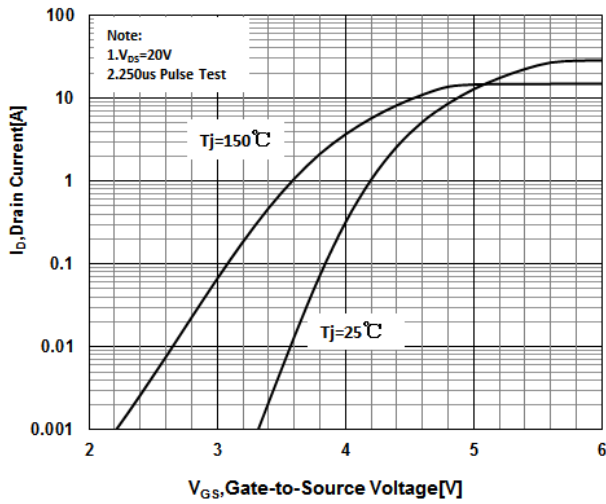


Figure 6 Typical Transfer Characteristics

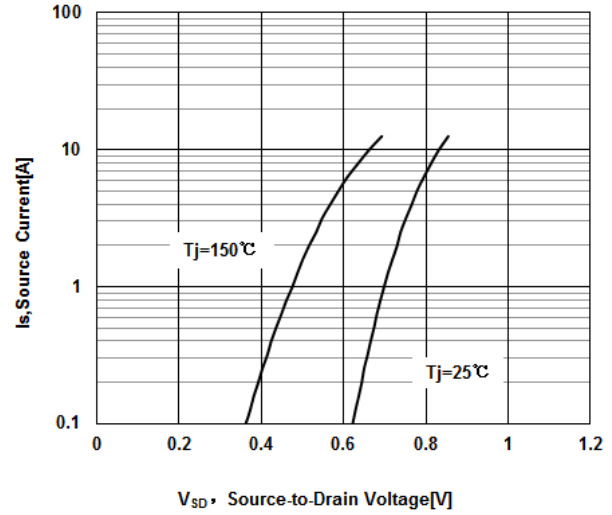


Figure 7 Typical Body Diode Transfer Characteristics

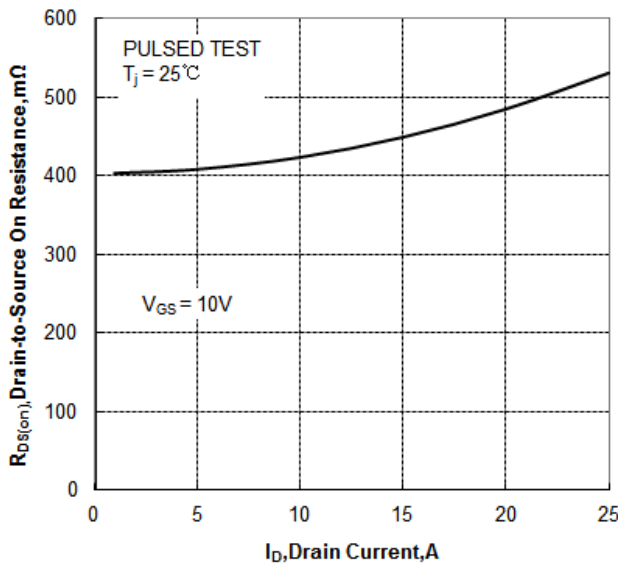


Figure 8 Typical Drain to Source ON Resistance vs Drain Current

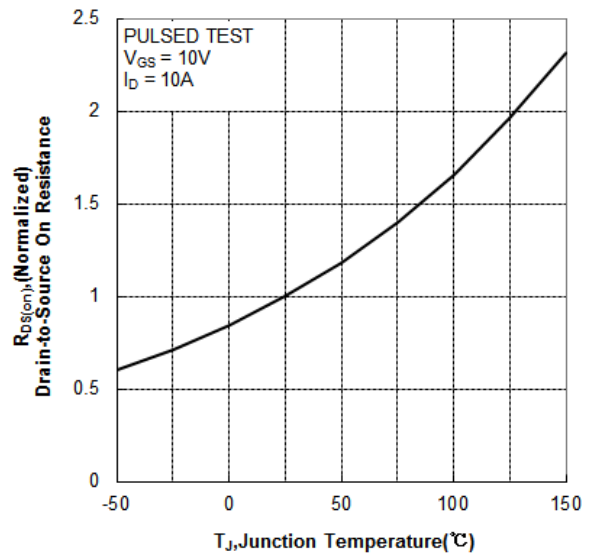


Figure 9 Typical Drain to Source on Resistance vs Junction Temperature

Typical Performance Characteristics

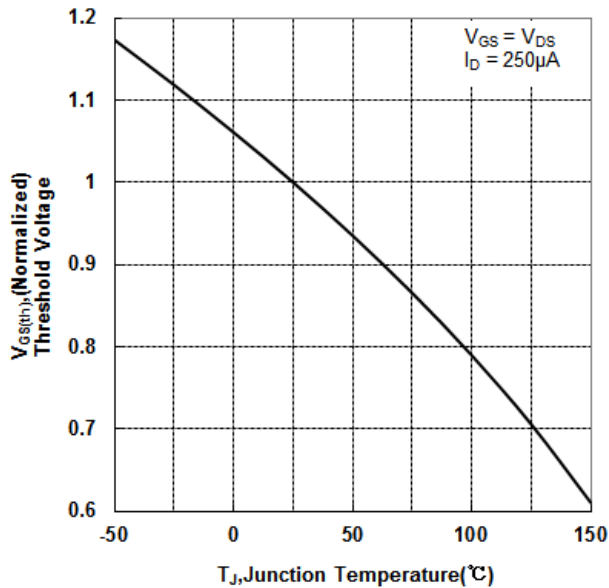


Figure 10 Typical Theshold Voltage vs Junction Temperature

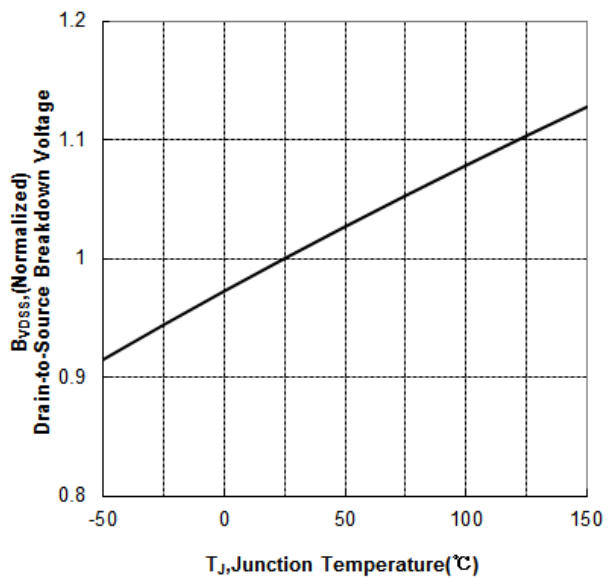


Figure 11 Typical Breakdown Voltage vs Junction Temperature

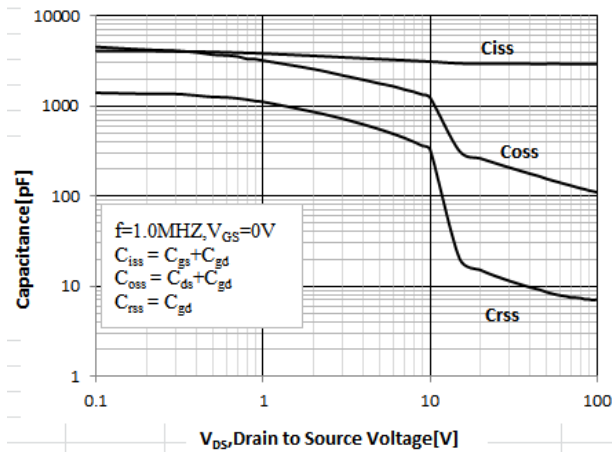


Figure 12 Typical Capacitance vs Drain to Source Voltage

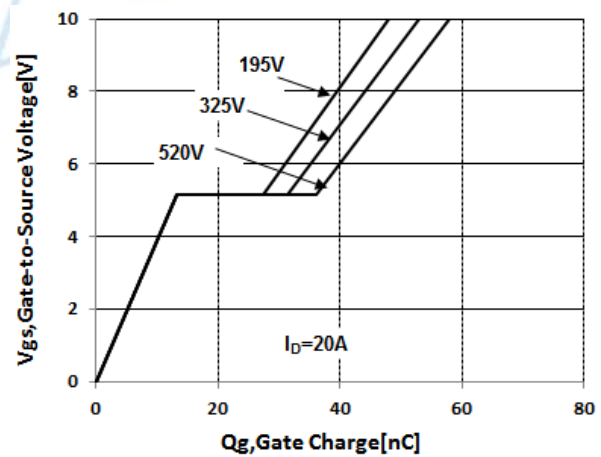
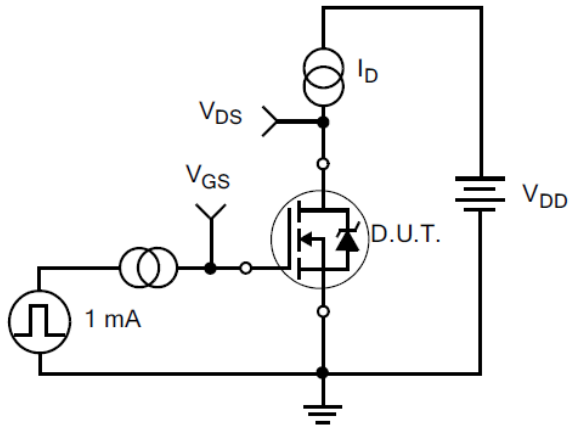
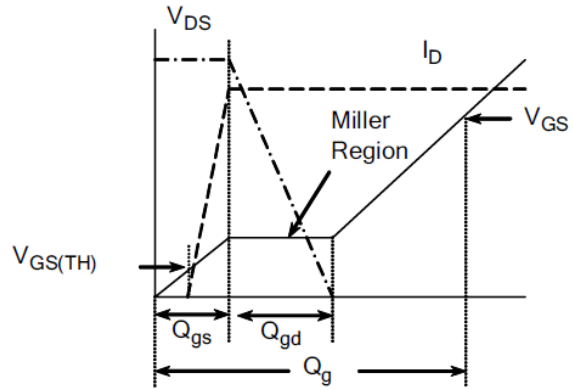


Figure 13 Typical Gate Charge vs Gate to Source Voltage

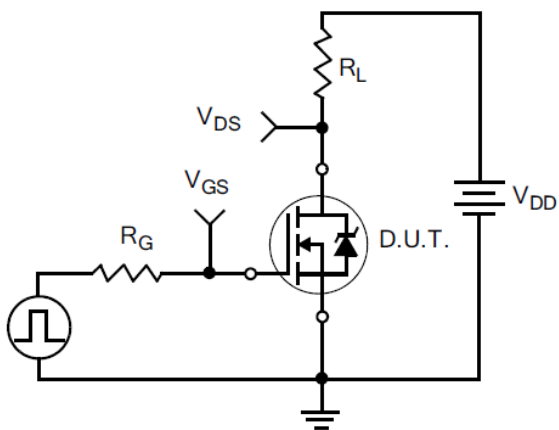
Test Circuit



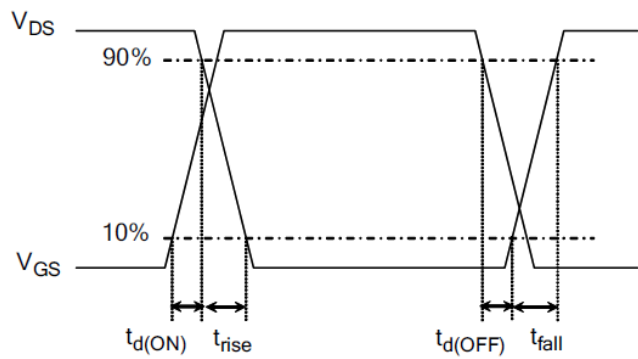
Gate Charge Test Circuit



Gate Charge Waveform

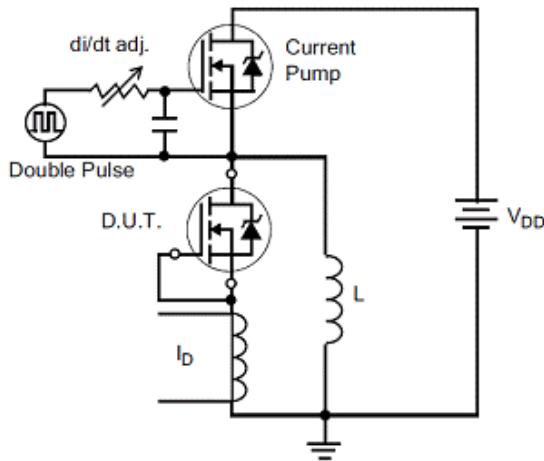


Resistive Switching Test Circuit

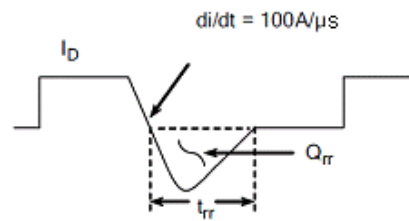


Resistive Switching Waveforms

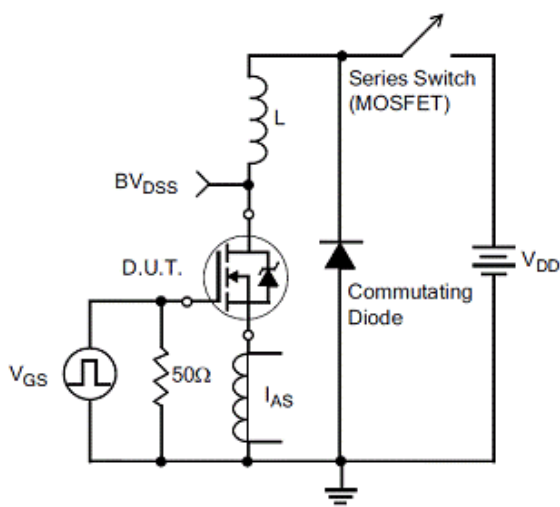
Test Circuit



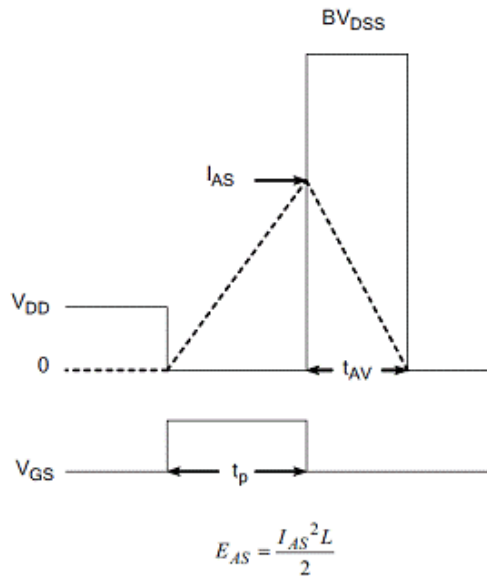
. Diode Reverse Recovery Test Circuit



. Diode Reverse Recovery Waveform



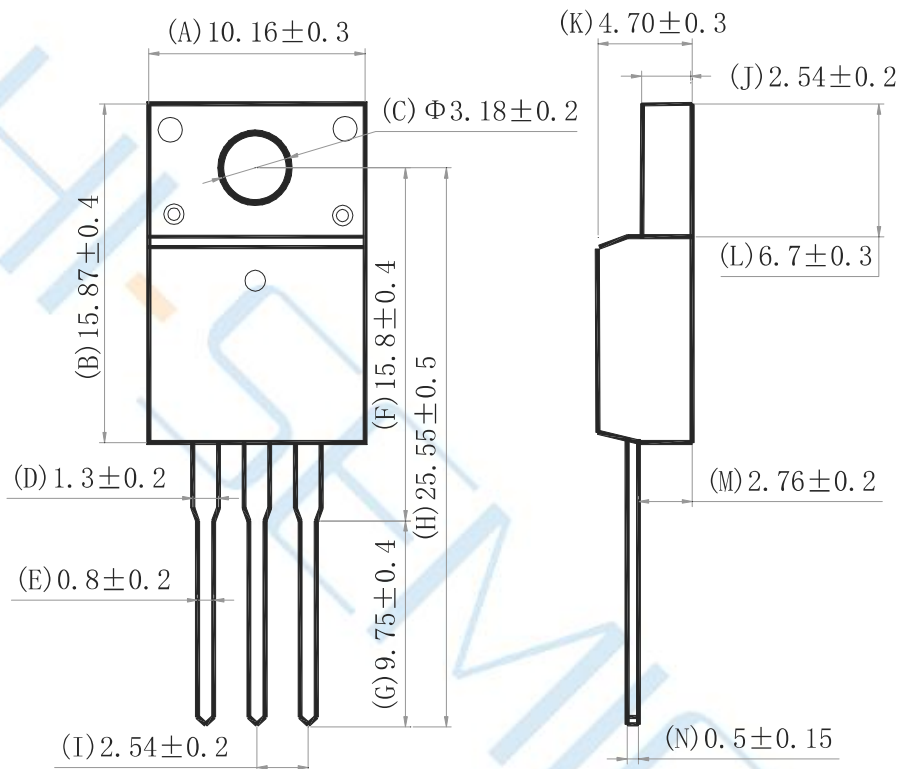
Unclamped Inductive Switching Test Circuit



. Unclamped Inductive Switching Waveforms

Package Dimensions of TO-220F-3L

Unit:mm



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