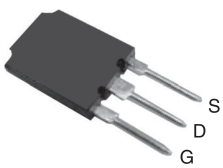
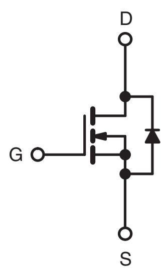
Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	600	
$R_{DS(on)}$ (Ω)	V_{GS} = 10 V	0.16
Q_g (Max.) (nC)	220	
Q_{gs} (nC)	64	
Q_{gd} (nC)	110	
Configuration	Single	

SUPER-247™





N-Channel MOSFET

FEATURES

- Low Gate Charge Q_g Results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Lead (Pb)-free Available

Pb Available

RoHS* COMPLIANT

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching

ORDERING INFORMATION	
Package	Super-247™
Lead (Pb)-free	IRFPS30N60KPbF
	SiHFPS30N60K-E3
SnPb	IRFPS30N60K
	SiHFPS30N60K

ABSOLUTE MAXIMUM RATINGS T_C = 25 °C, unless otherwise noted

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V_{DS}	600	V
Gate-Source Voltage			V_{GS}	± 30	
Continuous Drain Current	V_{GS} at 10 V	T_C = 25 °C	I_D	30	A
		T_C = 100 °C		19	
Pulsed Drain Current[a]			I_{DM}	120	
Linear Derating Factor				3.6	W/°C
Single Pulse Avalanche Energy[b]			E_{AS}	520	mJ
Repetitive Avalanche Current[a]			I_{AR}	30	A
Repetitive Avalanche Energy[a]			E_{AR}	45	mJ
Maximum Power Dissipation	T_C = 25 °C		P_D	450	W
Peak Diode Recovery dV/dt[c]			dV/dt	13	V/ns
Operating Junction and Storage Temperature Range			T_J, T_{stg}	- 55 to + 150	°C
Soldering Recommendations (Peak Temperature)	for 10 s			300[d]	

Notes

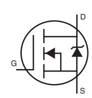
a. Repetitive rating; pulse width limited by maximum junction temperature.
b. Starting T_J = 25 °C, L = 1.1 mH, R_G = 25 Ω, I_{AS} = 30 A.
c. $I_{SD} \leq$ 30 A, dI/dt $\leq$ 630 A/μs, $V_{DD} \leq V_{DS}$, $T_J \leq$ 150 °C.
d. 1.6 mm from case.

* Pb containing terminations are not RoHS compliant, exemptions may apply

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient[a]	R_{thJA}	-	40	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain)[a]	R_{thJC}	-	0.28	

Note

a. R_{th} is measured at T_J approximately 90 °C.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	600	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA[d]	-	0.66	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	3.0	-	5.0	V
Gate-Source Leakage	I_{GSS}	V_{GS} = ± 30 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 600 V, V_{GS} = 0 V	-	-	50	μA
		V_{DS} = 480 V, V_{GS} = 0 V, T_J = 125 °C	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 18 A[b]	-	0.16	0.19	Ω
Forward Transconductance	g_{fs}	V_{DS} = 50 V, I_D = 18 A	16	-	-	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1.0 MHz	-	5870	-	pF
Output Capacitance	C_{oss}		-	530	-	
Reverse Transfer Capacitance	C_{rss}		-	54	-	
Output Capacitance	C_{oss}	V_{GS} = 0 V, V_{DS} = 1.0 V , f = 1.0 MHz	-	6920	-	
		V_{GS} = 0 V, V_{DS} = 480 V , f = 1.0 MHz	-	140	-	
Effective Output Capacitance	C_{oss} eff.	V_{GS} = 0 V, V_{DS} = 0 V to 480 V[c]	-	270	-	
Total Gate Charge	Q_g	V_{GS} = 10 V, I_D = 30 A, V_{DS} = 480 V[b]	-	-	220	nC
Gate-Source Charge	Q_{gs}		-	-	64	
Gate-Drain Charge	Q_{gd}		-	-	110	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 300 V, I_D = 30 A, R_G = 3.9 Ω, V_{GS} = 10 V[b]	-	29	-	ns
Rise Time	t_r		-	120	-	
Turn-Off Delay Time	$t_{d(off)}$		-	56	-	
Fall Time	t_f		-	50	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	30	A
Pulsed Diode Forward Current[a]	I_{SM}		-	-	120	
Body Diode Voltage	V_{SD}	T_J = 25 °C, I_S = 30 A, V_{GS} = 0 V[b]	-	-	1.5	V
Body Diode Reverse Recovery Time	t_{rr}	T_J = 25 °C, I_F = 30 A, dI/dt = 100 A/μs[b]	-	640	960	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	11	16	μC
Body Diode Recovery Current	I_{RRM}		-	31	-	A
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)				

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. Pulse width ≤ 300 μs; duty cycle ≤ 2 %.

c. C_{oss} eff. is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 to 80 % V_{DS}.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

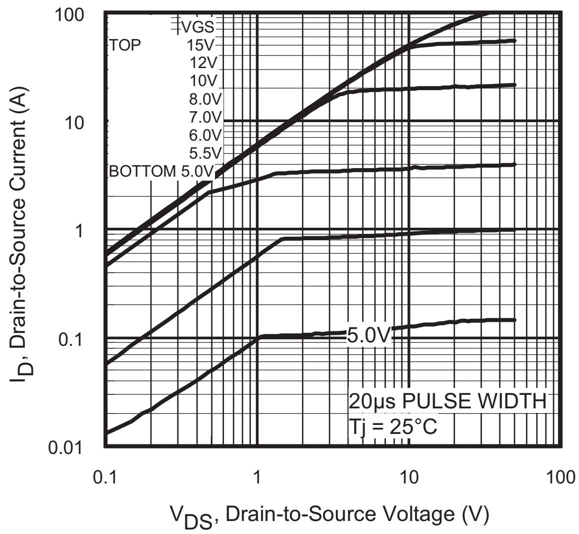


Fig. 1 - Typical Output Characteristics

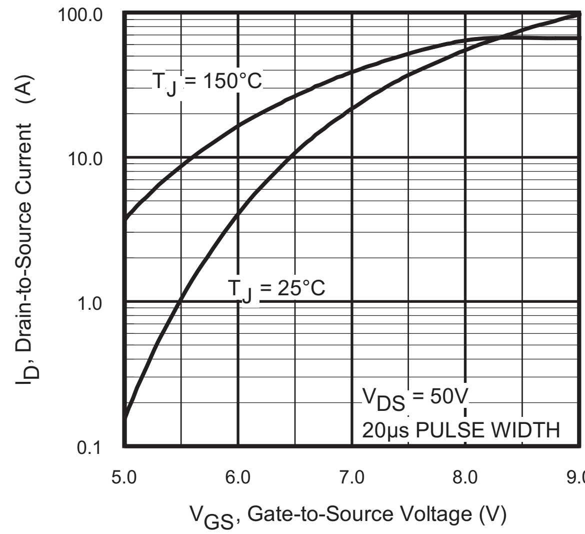


Fig. 3 - Typical Transfer Characteristics

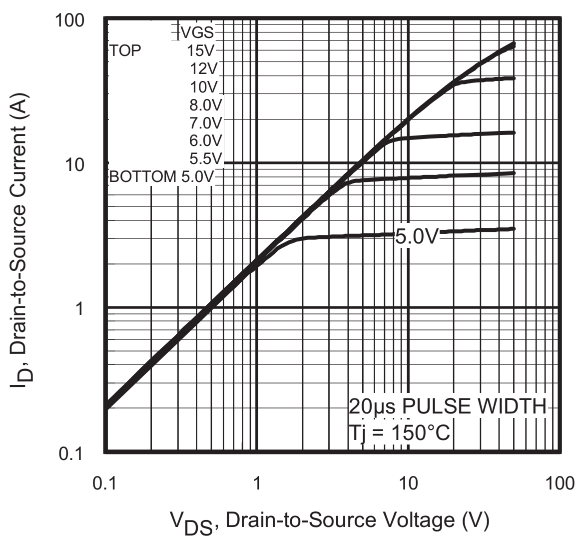


Fig. 2 - Typical Output Characteristics

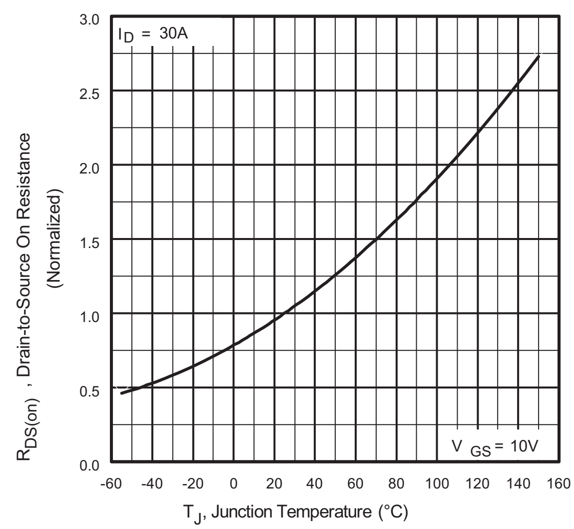


Fig. 4 - Normalized On-Resistance vs. Temperature

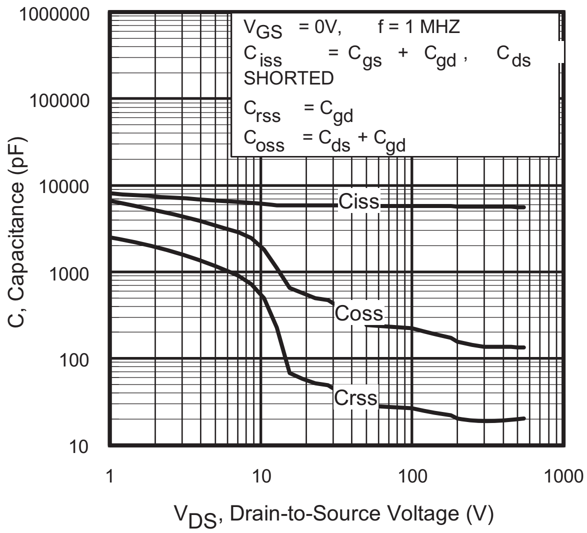


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

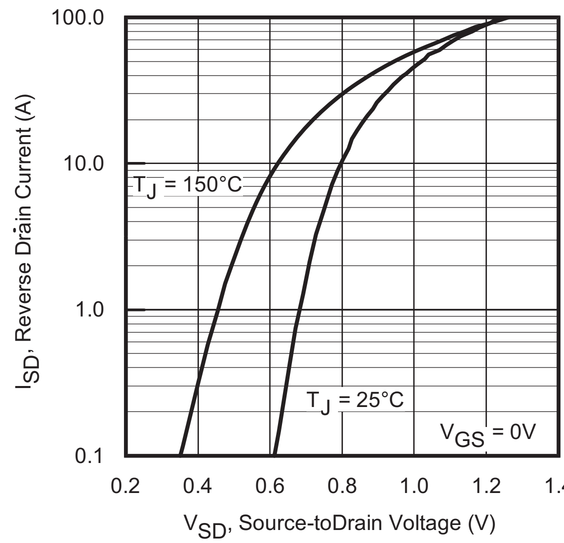


Fig. 7 - Typical Source-Drain Diode Forward Voltage

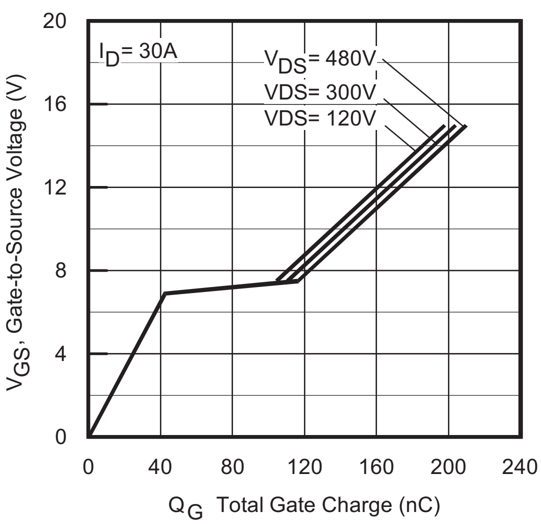


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

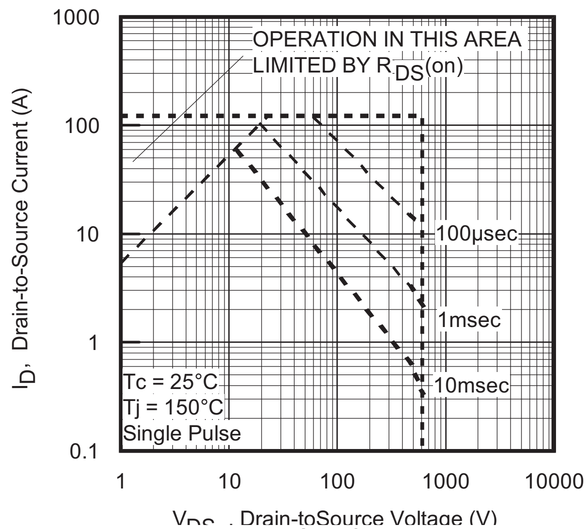


Fig. 8 - Maximum Safe Operating Area

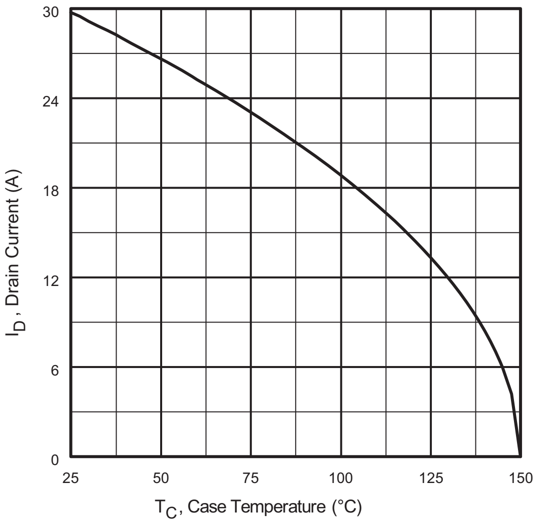


Fig. 9 - Maximum Drain Current vs. Case Temperature

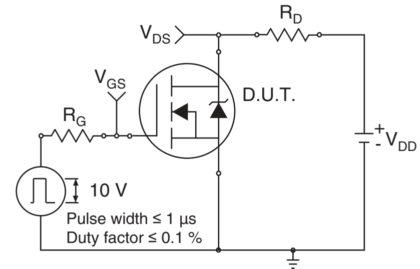


Fig. 10a - Switching Time Test Circuit

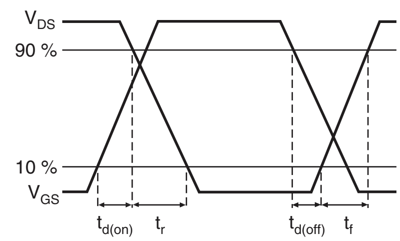


Fig. 10b - Switching Time Waveforms

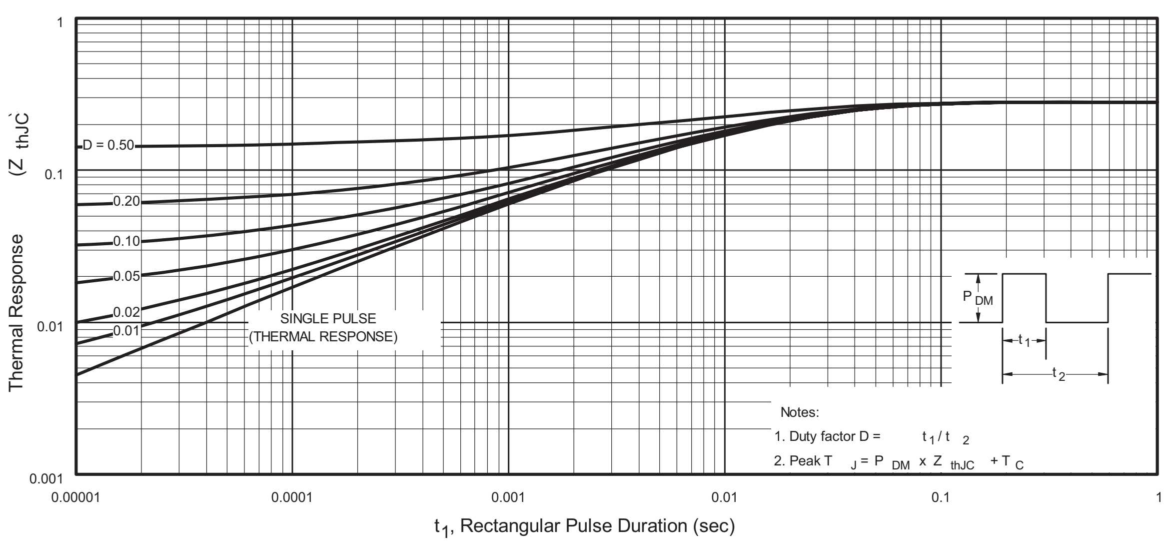


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

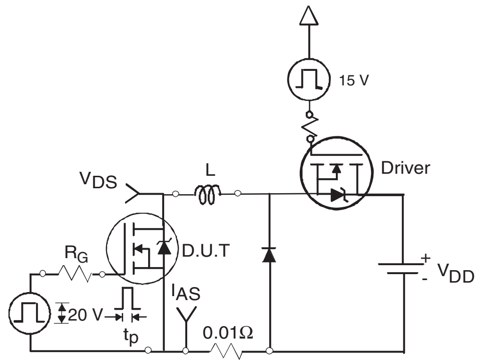


Fig. 12a - Unclamped Inductive Test Circuit

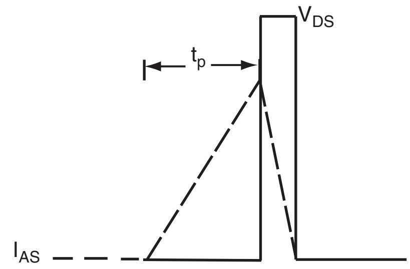


Fig. 12b - Unclamped Inductive Waveforms

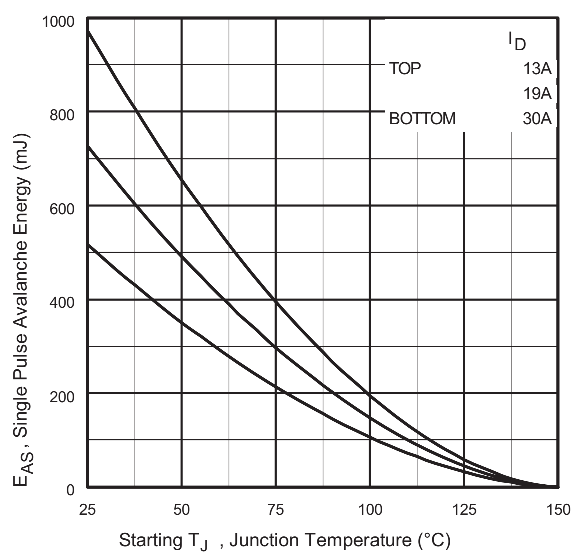


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

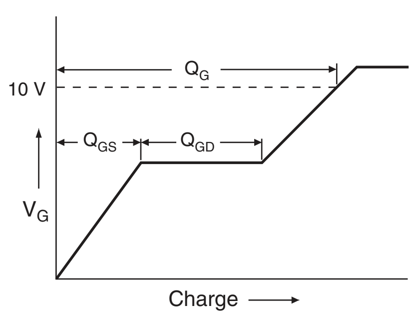


Fig. 13a - Basic Gate Charge Waveform

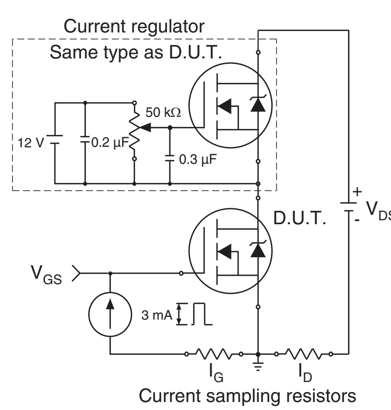
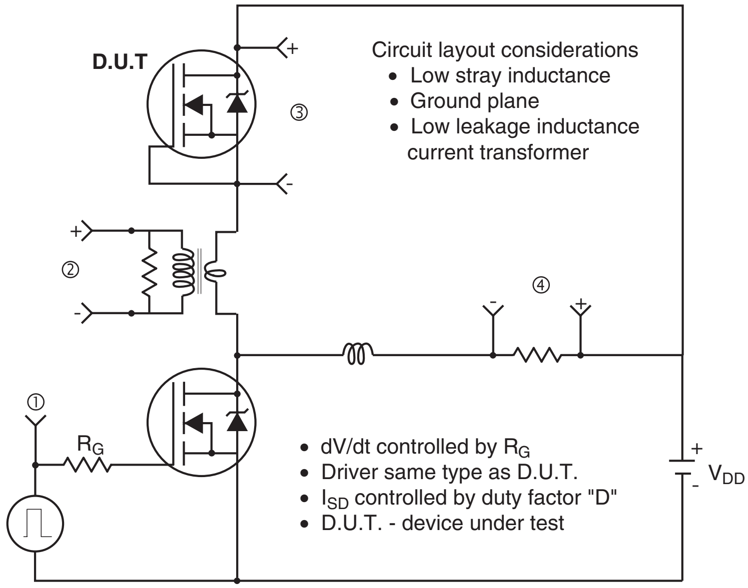
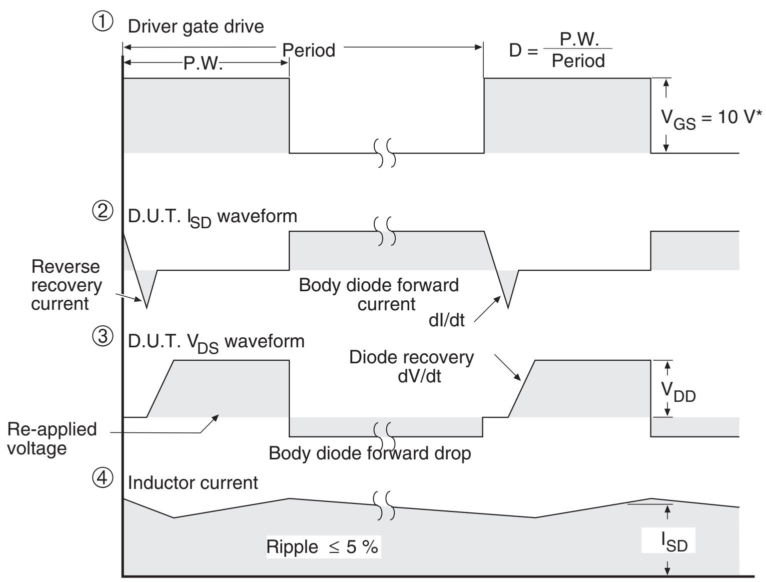


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit





* V_{GS} = 5 V for logic level devices

Fig. 14 - For N-Channel

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