

Power MOSFET

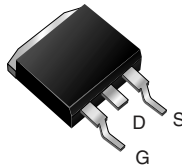
PRODUCT SUMMARY		
V_{DS} (V)	200	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	0.30
Q_g (Max.) (nC)	43	
Q_{gs} (nC)	7.0	
Q_{gd} (nC)	23	
Configuration	Single	

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Surface Mount
- Available in Tape and Reel
- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Compliant to RoHS Directive 2002/95/EC



D²PAK (TO-263)



N-Channel MOSFET

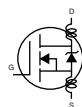
ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V_{DS}	200	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	I_D	$T_C = 25\text{ }^\circ\text{C}$	A
			$T_C = 100\text{ }^\circ\text{C}$	
Pulsed Drain Current ^a		I_{DM}	36	
Linear Derating Factor			0.59	W/ $^\circ\text{C}$
Linear Derating Factor (PCB Mount) ^e			0.025	
Single Pulse Avalanche Energy ^b		E_{AS}	250	mJ
Repetitive Avalanche Current ^a		I_{AR}	9.0	A
Repetitive Avalanche Energy ^a		E_{AR}	7.4	mJ
Maximum Power Dissipation		P_D	$T_C = 25\text{ }^\circ\text{C}$	W
Maximum Power Dissipation (PCB Mount) ^e			$T_A = 25\text{ }^\circ\text{C}$	
* Pb containing terminations are not RoHS compliant, exemptions may apply				
Peak Diode Recovery dV/dt^c		dV/dt	5.0	V/ns


ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
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 (see fig. 11).
- b. V_{DD} = 50 V, starting T_J = 25 °C, L = 4.6 mH, R_g = 25 Ω, I_{AS} = 9.0 A (see fig. 12).
- c. I_{SD} ≤ 9.0 A, di/dt ≤ 120 A/μs, V_{DD} ≤ V_{DS}, T_J ≤ 150 °C.
- d. 1.6 mm from case.
- e. When mounted on 1" square PCB (FR-4 or G-10 material).

THERMAL RESISTANCE RATINGS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mount) ^c	R _{thJA}	-	-	40	°C/W
Maximum Junction-to-Ambient	R _{thJA}	-	-	62	
Maximum Junction-to-Case (Drain)	R _{thJC}	-	-	1.7	

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, I _D = 250 μA		200	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA		-	0.24	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.0	-	4.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20 V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 200 V, V _{GS} = 0 V		-	-	25	μA
		V _{DS} = 160V, V _{GS} = 0 V, T _J = 125 °C		-	-	250	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 5.4 A ^b	-	0.30	-	Ω
Forward Transconductance	g _{fs}	V _{DS} = 50 V, I _D = 5.4 A ^b		3.8	-	-	S
Dynamic							
Input Capacitance	C _{iSS}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5		-	800	-	pF
Output Capacitance	C _{oss}			-	240	-	
Reverse Transfer Capacitance	C _{rSS}			-	76	-	
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 5.9 A, V _{DS} = 160 V see fig. 6 and 13 ^b	-	-	43	nC
Gate-Source Charge	Q _{gs}			-	-	7.0	
Gate-Drain Charge	Q _{gd}			-	-	23	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 100 V, I _D = 5.9 A R _g = 12 Ω, R _D = 16 Ω see fig. 10 ^b		-	9.4	-	ns
Rise Time	t _r			-	28	-	
Turn-Off Delay Time	t _{d(off)}			-	39	-	
Fall Time	t _f			-	20	-	
Internal Drain Inductance	L _D	Between lead, 6 mm (0.25") from package and center of die contact 		-	4.5	-	nH
Internal Source Inductance	L _S			-	7.5	-	

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	9.0	A
Pulsed Diode Forward Current ^a	I _{SM}		-	-	36	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 9.0 A, V _{GS} = 0 V ^b	-	-	2.0	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 5.9 A, di/dt = 100 A/μs ^b	-	170	340	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	1.1	2.2	μC
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. When mounted on 1" square PCB (FR-4 or G-10 material).

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

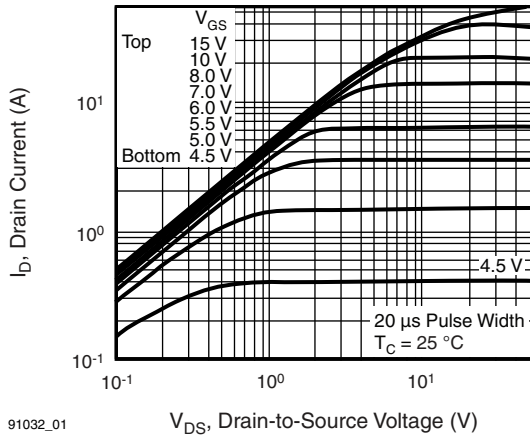


Fig. 1 - Typical Output Characteristics, T_C = 25 °C

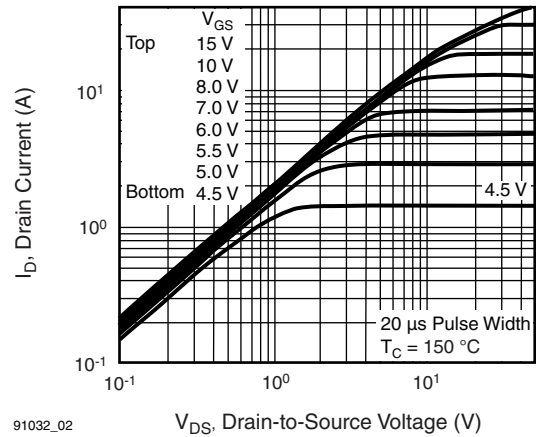


Fig. 2 - Typical Output Characteristics, T_C = 150 °C

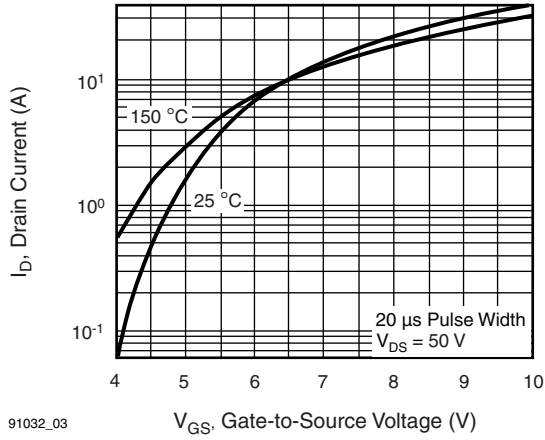


Fig. 3 - Typical Transfer Characteristics

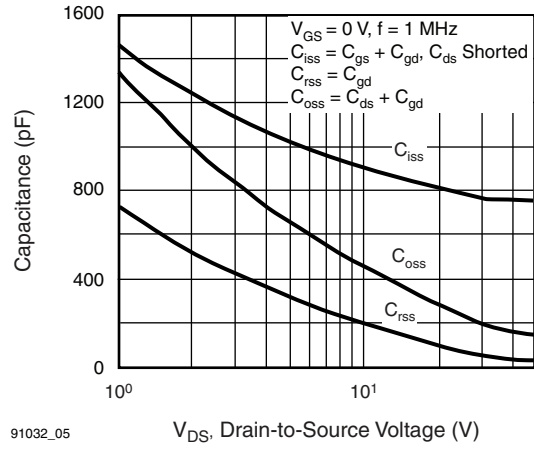


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

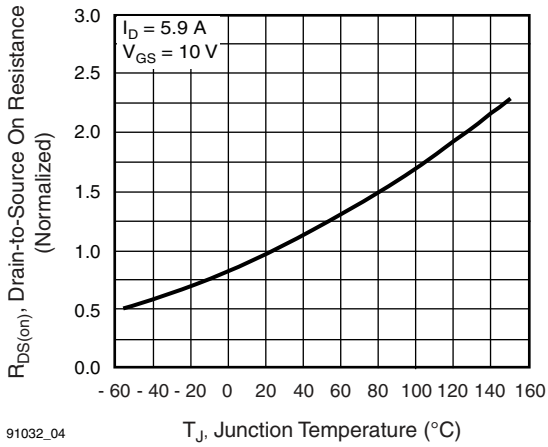


Fig. 4 - Normalized On-Resistance vs. Temperature

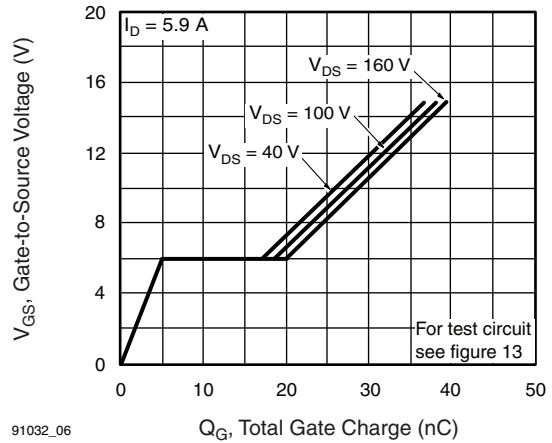
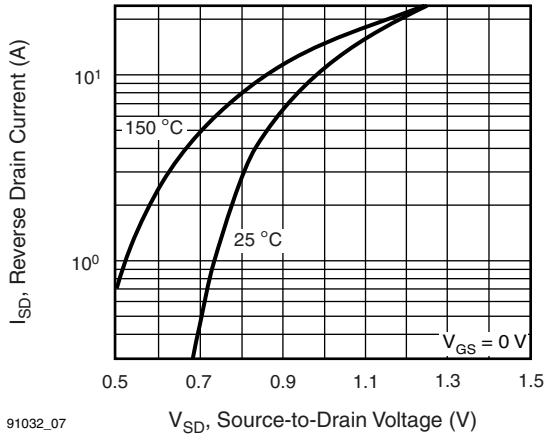
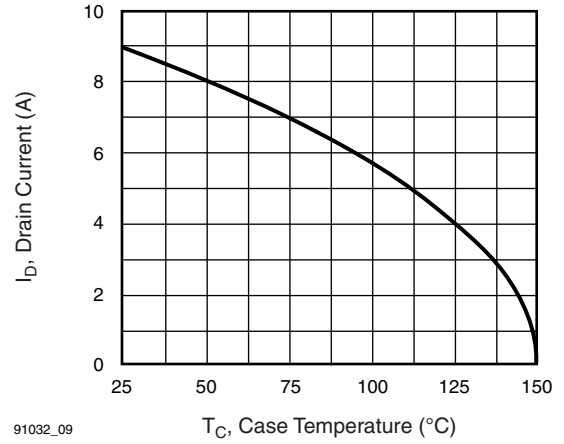


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



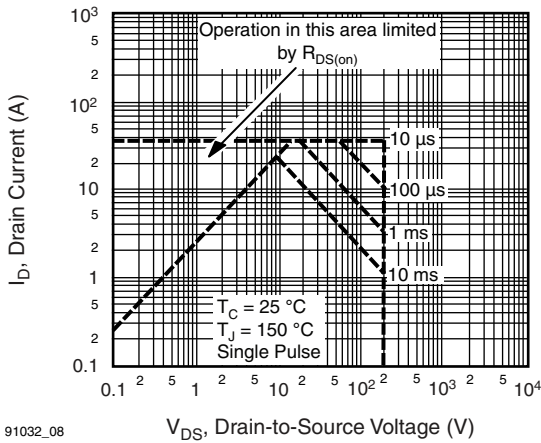
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Fig. 7 - Typical Source-Drain Diode Forward Voltage



91032_09

Fig. 9 - Maximum Drain Current vs. Case Temperature



91032_08

Fig. 8 - Maximum Safe Operating Area

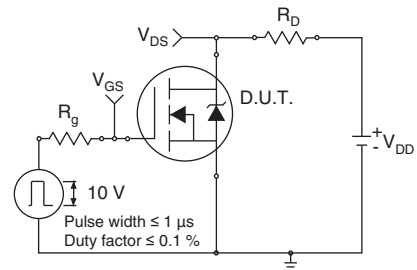


Fig. 10a - Switching Time Test Circuit

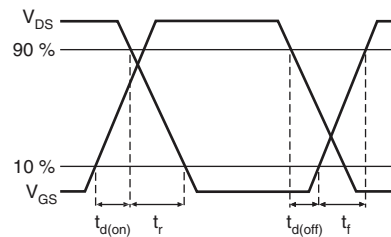


Fig. 10b - Switching Time Waveforms

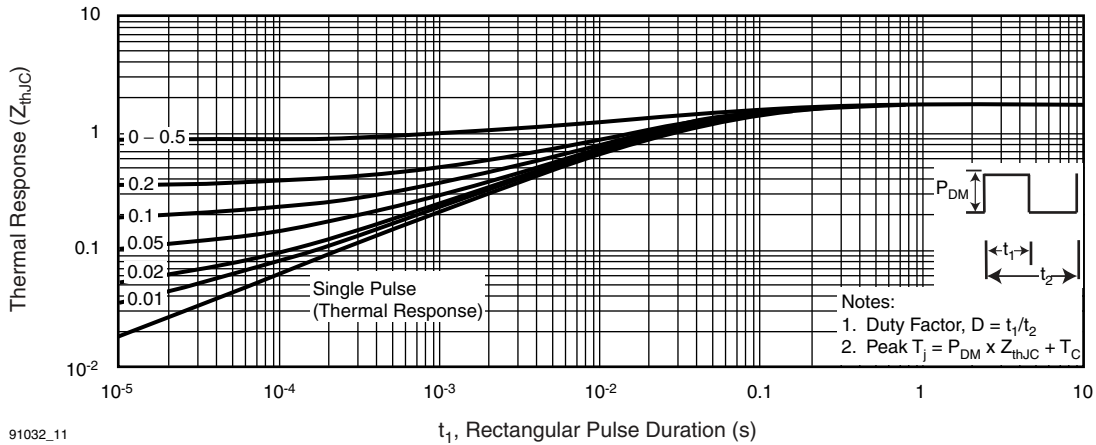


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

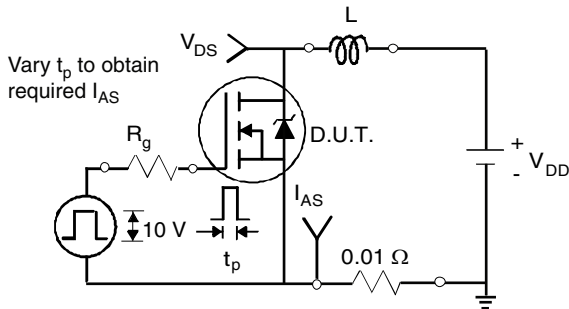


Fig. 12a - Unclamped Inductive Test Circuit

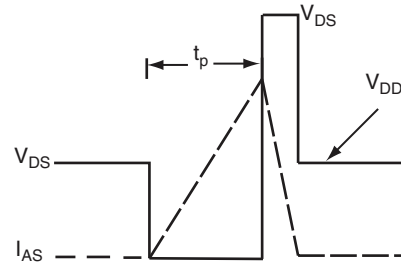


Fig. 12b - Unclamped Inductive Waveforms

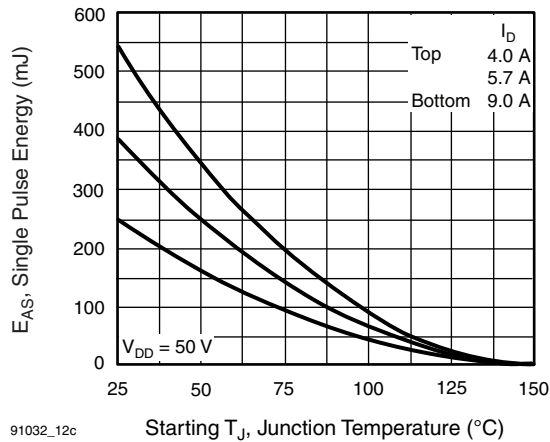


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

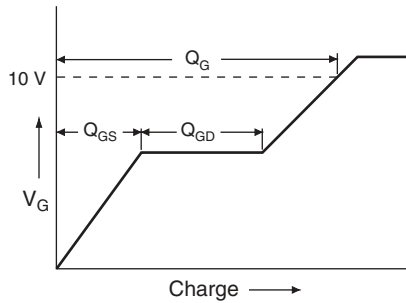


Fig. 13a - Basic Gate Charge Waveform

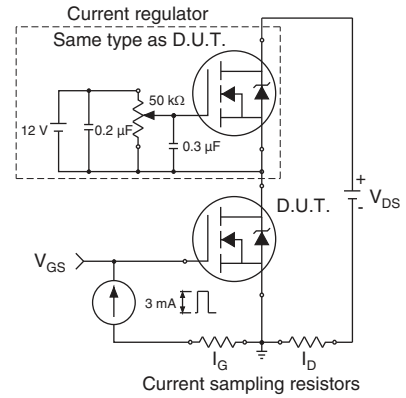
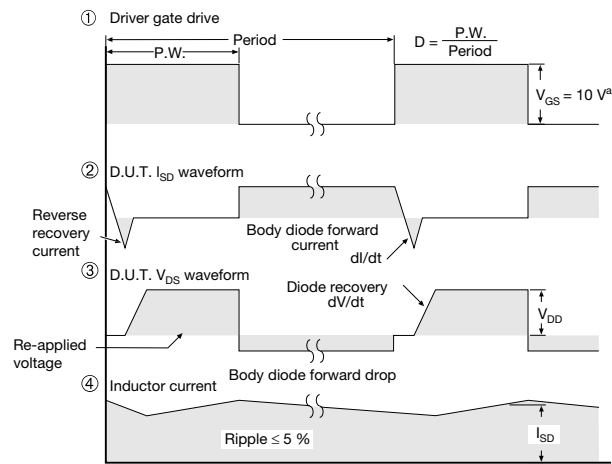
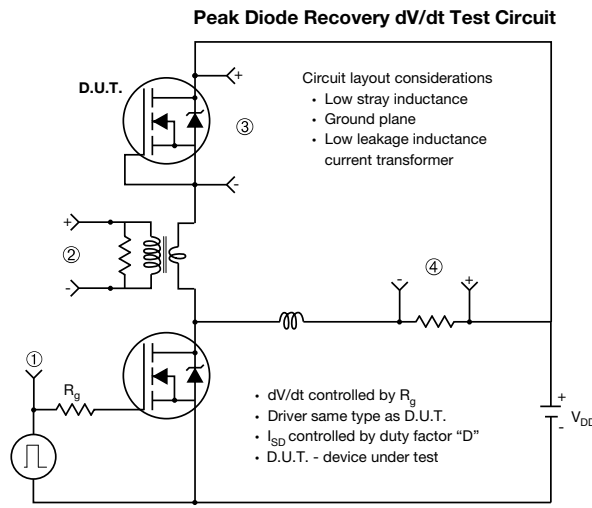


Fig. 13b - Gate Charge Test Circuit



Note
a. $V_{GS} = 5V$ for logic level devices

Fig. 14 - For N-Channel

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