

Power MOSFET

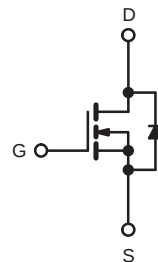
PRODUCT SUMMARY		
V_{DS} (V)	100	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$	0.020
Q_g (Max.) (nC)	70	
Q_{gs} (nC)	13	
Q_{gd} (nC)	39	
Configuration	Single	

FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Surface Mount
- Low-Profile Through-Hole
- Available in Tape and Reel
- Dynamic dV/dt Rating
- 150 °C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Compliant to RoHS Directive 2002/95/EC



RoHS*
COMPLIANT
HALOGEN
FREE
Available



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)					
PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V _{DS}	100	V
Gate-Source Voltage			V _{GS}	±20	
Continuous Drain Current	V _{GS} at 10 V	T _C = 25 °C	I _D	70	A
		T _C = 100 °C		56	
Pulsed Drain Current ^{a, e}			I _{DM}	250	
Linear Derating Factor				1.0	W/°C
Single Pulse Avalanche Energy ^{b, e}			E _{AS}	580	mJ
Avalanche Current ^a			I _{AR}	20	A
Repetitiive Avalanche Energy ^a			E _{AR}	13	mJ
Maximum Power Dissipation	T _C = 25 °C		P _D	3.1	W
	T _A = 25 °C			130	
Peak Diode Recovery dV/dt ^{c, e}			dV/dt	5.0	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

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 2.7\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 18\text{ A}$ (see fig. 12).
- $I_{SD} \leq 20\text{ A}$, $dI/dt \leq 150\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 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 (PCB Mounted, Steady-State) ^a	R_{thJA}	-	40	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	1.0	

Note

a. When mounted on 1" square PCB (FR-4 or G-10 material).

SPECIFICATIONS ($T_J = 25\text{ °C}$, 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		100	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA ^c		-	0.29	-	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} =100 V, V _{GS} = 0 V		-	-	25	μA
		V _{DS} = 80 V, V _{GS} = 0 V, T _J = 125 °C		-	-	250	
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 11 A ^b	-	0.020	-	Ω
Forward Transconductance	g _{fs}	V _{DS} = 50 V, I _D = 11 A ^d		6.7	-	-	S
Dynamic							
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5 ^d		-	1300	-	pF
Output Capacitance	C _{oss}			-	430	-	
Reverse Transfer Capacitance	C _{rss}			-	130	-	
Total Gate Charge	Q _g	V _{GS} = 10 V	I _D = 20 A, V _{DS} = 160 V, see fig. 6 and 13 ^{b, c}	-	-	70	nC
Gate-Source Charge	Q _{gs}			-	-	13	
Gate-Drain Charge	Q _{gd}			-	-	39	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 50 V, I _D = 20 A, R _g = 9.1 Ω, R _D = 5.4 Ω, see fig. 10 ^{b, c}		-	14	-	ns
Rise Time	t _r			-	51	-	
Turn-Off Delay Time	t _{d(off)}			-	45	-	
Fall Time	t _f			-	36	-	
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	20	A
Pulsed Diode Forward Current ^a	I _{SM}			-	-	72	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 20 A, V _{GS} = 0 V ^b		-	-	2.0	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 20 A, dI/dt = 100 A/μs ^{b, c}		-	300	610	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	3.4	7.1	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.
- Uses IRF640/SiHF640 data and test conditions.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

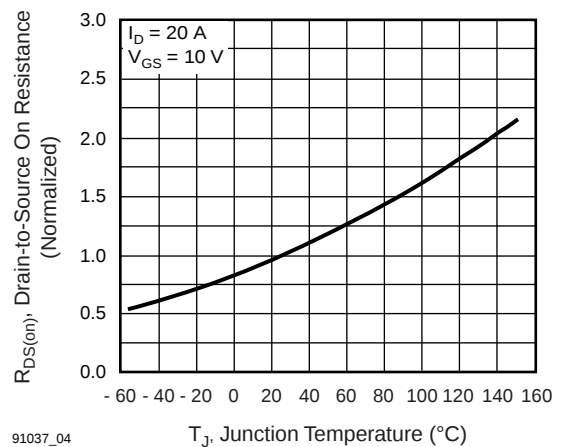
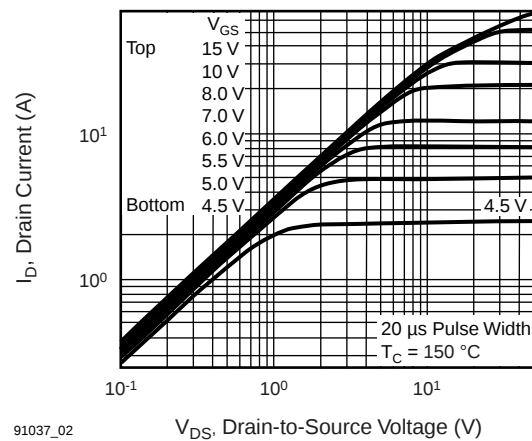
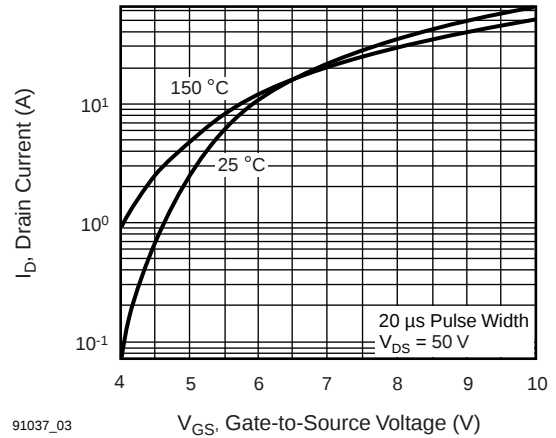
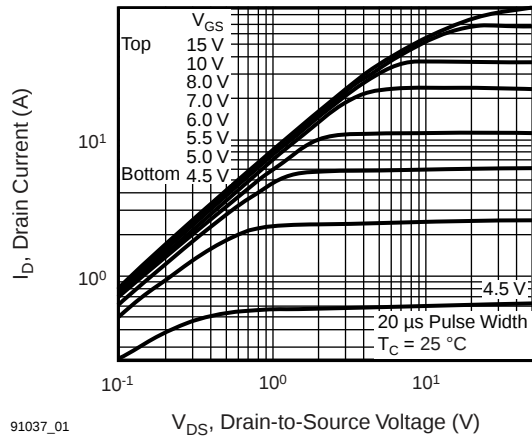




Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage



Fig. 7 - Typical Source-Drain Diode Forward Voltage



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

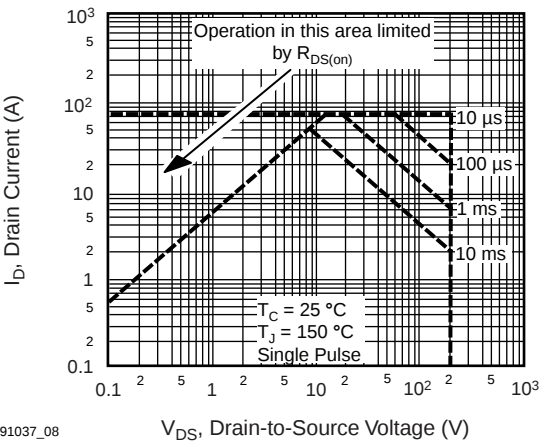


Fig. 8 - Maximum Safe Operating Area



Fig. 9 - Maximum Drain Current vs. Case Temperature



Fig. 10a - Switching Time Test Circuit

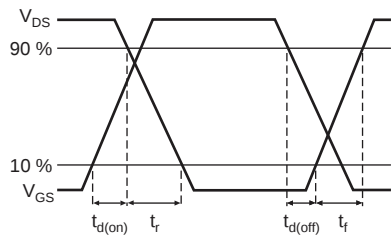


Fig. 10b - Switching Time Waveforms



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



Fig. 12a - Unclamped Inductive Test Circuit



Fig. 12b - Unclamped Inductive Waveforms

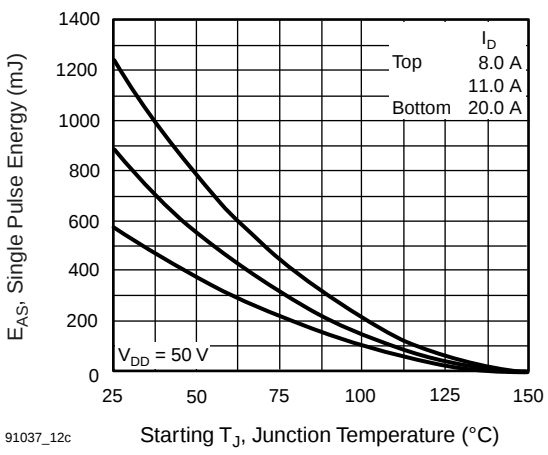


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

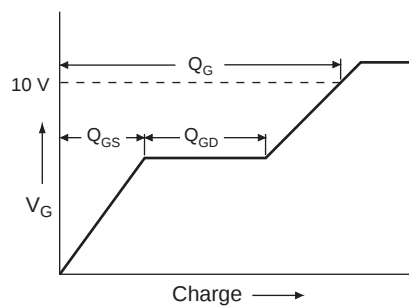


Fig. 13a - Basic Gate Charge Waveform

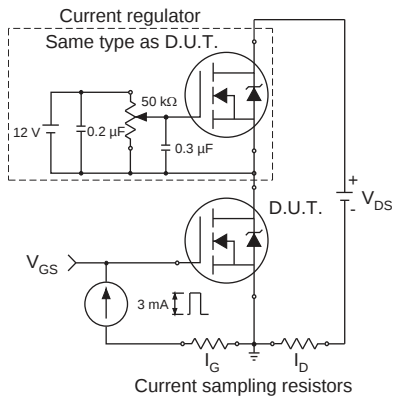


Fig. 13b - Gate Charge Test Circuit



Note

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

Fig. 14 - For N-Channel

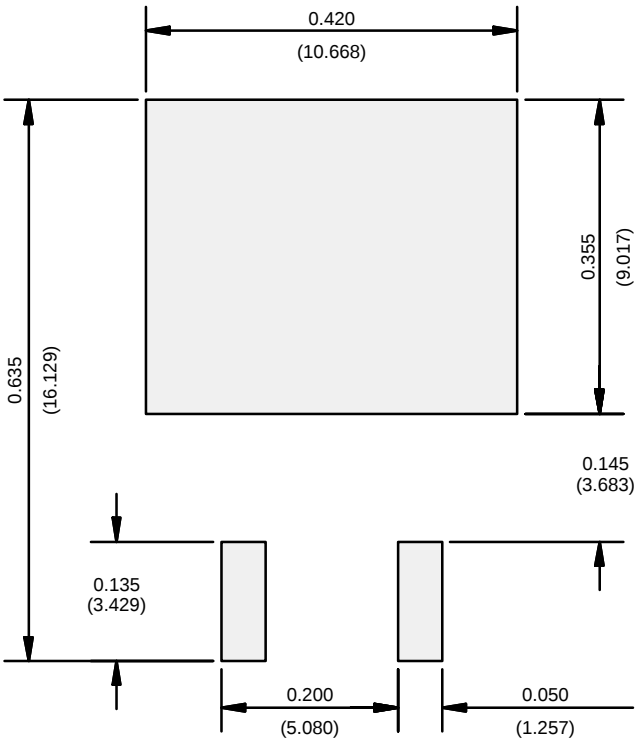
Technical drawing of a mechanical part, showing multiple views and annotations:

- Top View:** Shows dimensions E , D , H , $L1$, $L2$, $L3$, $L4$, $L5$, $L6$, $L7$, $L8$, $L9$, $L10$, $L11$, $L12$, $L13$, $L14$, $L15$, $L16$, $L17$, $L18$, $L19$, $L20$, $L21$, $L22$, $L23$, $L24$, $L25$, $L26$, $L27$, $L28$, $L29$, $L30$, $L31$, $L32$, $L33$, $L34$, $L35$, $L36$, $L37$, $L38$, $L39$, $L40$, $L41$, $L42$, $L43$, $L44$, $L45$, $L46$, $L47$, $L48$, $L49$, $L50$, $L51$, $L52$, $L53$, $L54$, $L55$, $L56$, $L57$, $L58$, $L59$, $L60$, $L61$, $L62$, $L63$, $L64$, $L65$, $L66$, $L67$, $L68$, $L69$, $L70$, $L71$, $L72$, $L73$, $L74$, $L75$, $L76$, $L77$, $L78$, $L79$, $L80$, $L81$, $L82$, $L83$, $L84$, $L85$, $L86$, $L87$, $L88$, $L89$, $L90$, $L91$, $L92$, $L93$, $L94$, $L95$, $L96$, $L97$, $L98$, $L99$, $L100$. It includes feature control frames for surface texture (Ra), circular runout (ϕ), and position (ϕ). Datum A is indicated.
- Front View:** Shows dimensions A , B , C , D , E , F , G , H , I , J , K , L , M , N , O , P , Q , R , S , T , U , V , W , X , Y , Z . It includes feature control frames for surface texture (Ra), circular runout (ϕ), and position (ϕ). Datum A is indicated.
- Side View:** Shows dimensions A , B , C , D , E , F , G , H , I , J , K , L , M , N , O , P , Q , R , S , T , U , V , W , X , Y , Z . It includes feature control frames for surface texture (Ra), circular runout (ϕ), and position (ϕ). Datum A is indicated.
- Detail A:** A circular detail view of a specific feature, showing dimensions A , B , C , D , E , F , G , H , I , J , K , L , M , N , O , P , Q , R , S , T , U , V , W , X , Y , Z . It includes feature control frames for surface texture (Ra), circular runout (ϕ), and position (ϕ). Datum A is indicated.
- Section B-B and C-C:** A cross-sectional view showing the internal structure, including plating and base metal. It includes dimensions A , B , C , D , E , F , G , H , I , J , K , L , M , N , O , P , Q , R , S , T , U , V , W , X , Y , Z . It includes feature control frames for surface texture (Ra), circular runout (ϕ), and position (ϕ). Datum A is indicated.
- View A-A:** A cross-sectional view showing the internal structure, including plating and base metal. It includes dimensions A , B , C , D , E , F , G , H , I , J , K , L , M , N , O , P , Q , R , S , T , U , V , W , X , Y , Z . It includes feature control frames for surface texture (Ra), circular runout (ϕ), and position (ϕ). Datum A is indicated.

	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380
ECN: S-82110-Rev. A, 15-Sep-08 DWG: 5970				

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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