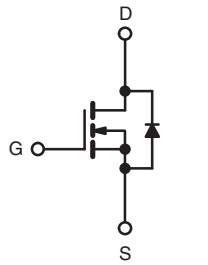
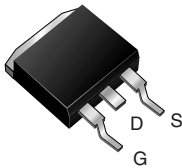


Power MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	400
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$ 1.0
Q_g (Max.) (nC)	38
Q_{gs} (nC)	5.7
Q_{gd} (nC)	22
Configuration	Single

D²PAK (TO-263)


N-Channel MOSFET

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



RoHS*
COMPLIANT
HALOGEN
FREE
Available

DESCRIPTION

Third generation Power MOSFETs from Vishay provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The D²PAK (TO-263) is a surface mount power package capable of accommodating die size up to HEX-4. It provides the highest power capability and the lowest possible on-resistance in any existing surface mount package. The D²PAK (TO-263) is suitable for high current applications because of its low internal connection resistance and can dissipate up to 2.0 W in a typical surface mount application.

ORDERING INFORMATION			
Package	D ² PAK (TO-263)	D ² PAK (TO-263)	D ² PAK (TO-263)
Lead (Pb)-free and Halogen-free	SiHF730S-GE3	SiHF730STRL-GE3 ^a	SiHF730STRR-GE3 ^a
Lead (Pb)-free	IRF730SPbF	IRF730STRLPbF ^a	-
	SiHF730S-E3	SiHF730STL-E3 ^a	-
	SiHF730S-E3	SiHF730STL-E3 ^a	-

Note

a. See device orientation.

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)					
PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V_{DS}	400	V
Gate-Source Voltage			V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	$T_C = 25\text{ }^\circ\text{C}$	I_D	5.5	A
		$T_C = 100\text{ }^\circ\text{C}$		3.5	
Pulsed Drain Current ^a			I_{DM}	22	W/ $^\circ\text{C}$
Linear Derating Factor				0.59	
Linear Derating Factor (PCB Mount) ^e				0.025	
Single Pulse Avalanche Energy ^b			E_{AS}	290	mJ
Avalanche Current ^a			I_{AR}	5.5	A
Repetitive Avalanche Energy ^a			E_{AR}	7.4	mJ
Maximum Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$		P_D	74	W
	$T_A = 25\text{ }^\circ\text{C}$			3.1	
Peak Diode Recovery dV/dt ^c			dV/dt	4.0	V/ns
Operating Junction and Storage Temperature Range			T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$
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 $T_J = 25\text{ }^\circ\text{C}$, $L = 16\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 5.5\text{ A}$ (see fig. 12).
- $I_{SD} \leq 5.5\text{ A}$, $dI/dt \leq 90\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).

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

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

Note

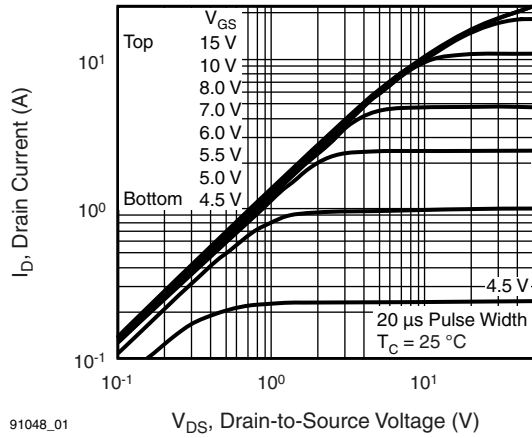
a. When mounted on 1" square PCB (FR-4 or G-10 material).

SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX. UNIT	
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$		400	-	- V	
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}$		-	0.54	- V/°C	
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$		2.0	-	4.0 V	
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20\text{ V}$		-	-	$\pm 100\text{ nA}$	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}$		-	-	25 μA	
		$V_{DS} = 320\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$		-	-	250 μA	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 3.3\text{ A}^b$	-	-	1.0 Ω	
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}, I_D = 3.3\text{ A}^b$		2.9	-	- S	
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}$, see fig. 5		-	700	-	
Output Capacitance	C_{oss}			-	170	-	pF
Reverse Transfer Capacitance	C_{rss}			-	64	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$I_D = 3.5\text{ A}, V_{DS} = 320\text{ V}$, see fig. 6 and 13 ^b	-	-	38	
Gate-Source Charge	Q_{gs}			-	-	5.7	nC
Gate-Drain Charge	Q_{gd}			-	-	22	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 200\text{ V}, I_D = 3.5\text{ A}, R_g = 12\text{ }\Omega, R_D = 57\text{ }\Omega$, see fig. 10 ^b		-	10	-	
Rise Time	t_r			-	15	-	ns
Turn-Off Delay Time	$t_{d(off)}$			-	38	-	
Fall Time	t_f			-	14	-	
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact 		-	4.5	-	
Internal Source Inductance	L_S			-	7.5	-	nH
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 		-	-	5.5	
Pulsed Diode Forward Current ^a	I_{SM}			-	-	22	A
Body Diode Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = 5.5\text{ A}, V_{GS} = 0\text{ V}^b$		-	-	1.6 V	
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = 3.5\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}^b$		-	270	530 ns	
Body Diode Reverse Recovery Charge	Q_{rr}			-	1.8	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

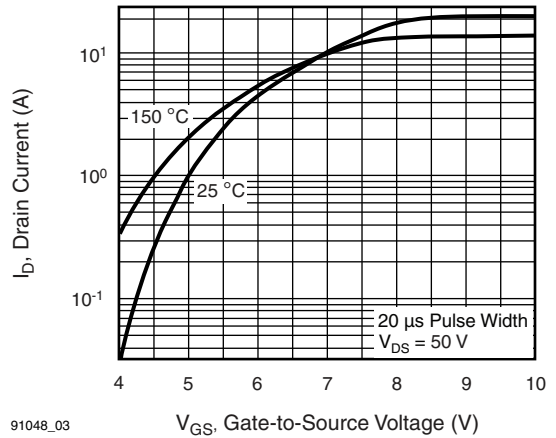
- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



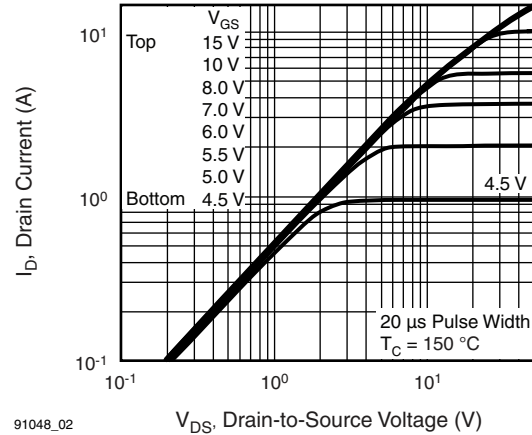
91048_01

Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ }^\circ\text{C}$



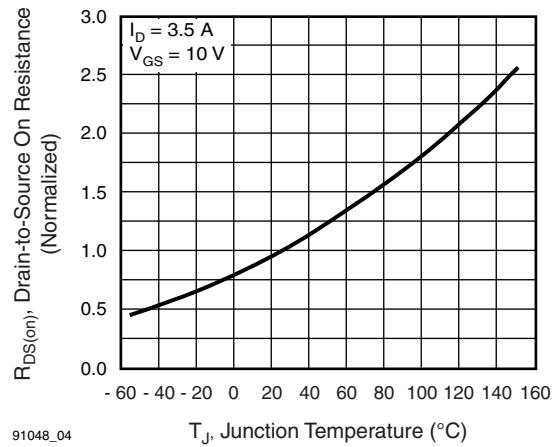
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Fig. 3 - Typical Transfer Characteristics



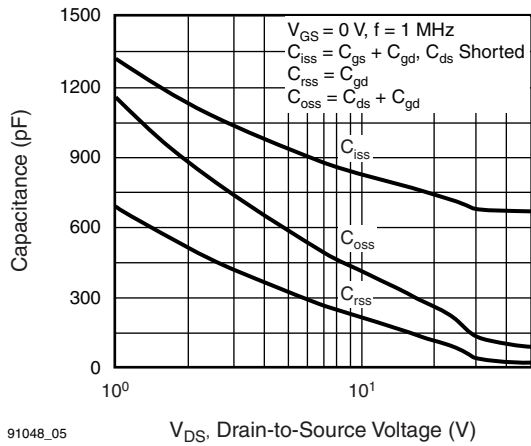
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Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^\circ\text{C}$



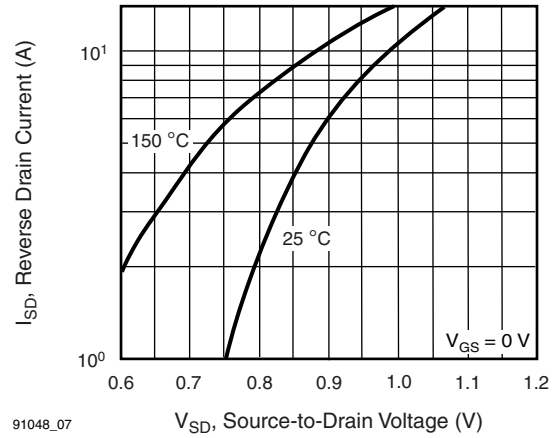
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Fig. 4 - Normalized On-Resistance vs. Temperature



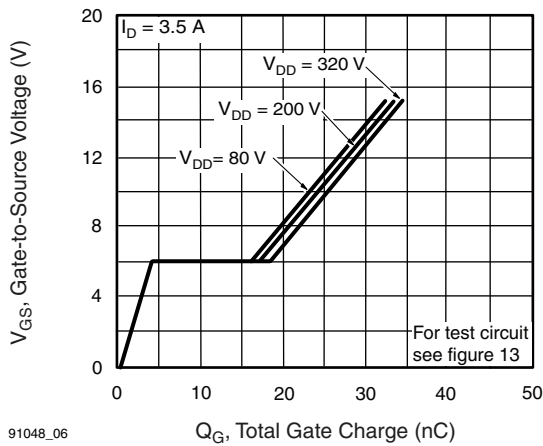
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Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage



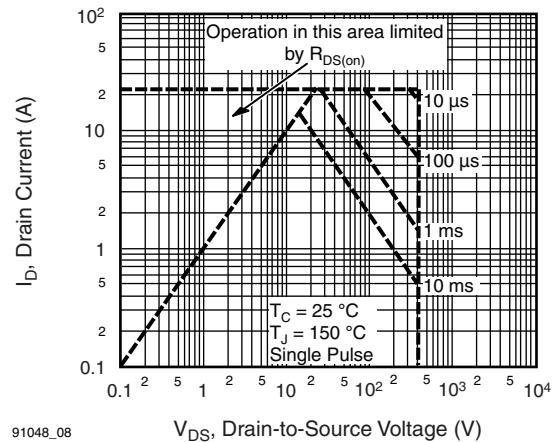
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Fig. 7 - Typical Source-Drain Diode Forward Voltage



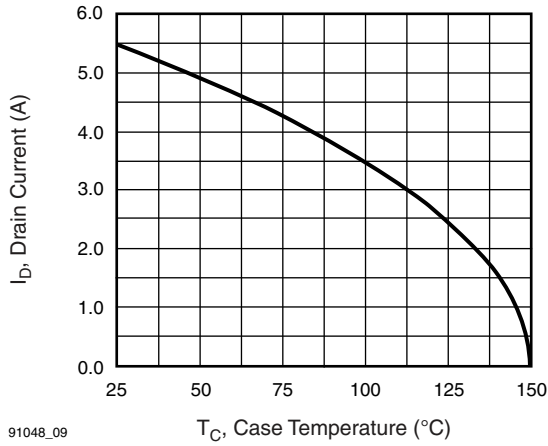
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Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



91048_08

Fig. 8 - Maximum Safe Operating Area



91048_09

Fig. 9 - Maximum Drain Current vs. Case Temperature

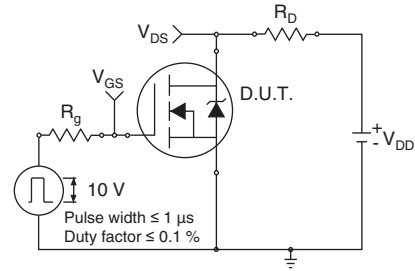
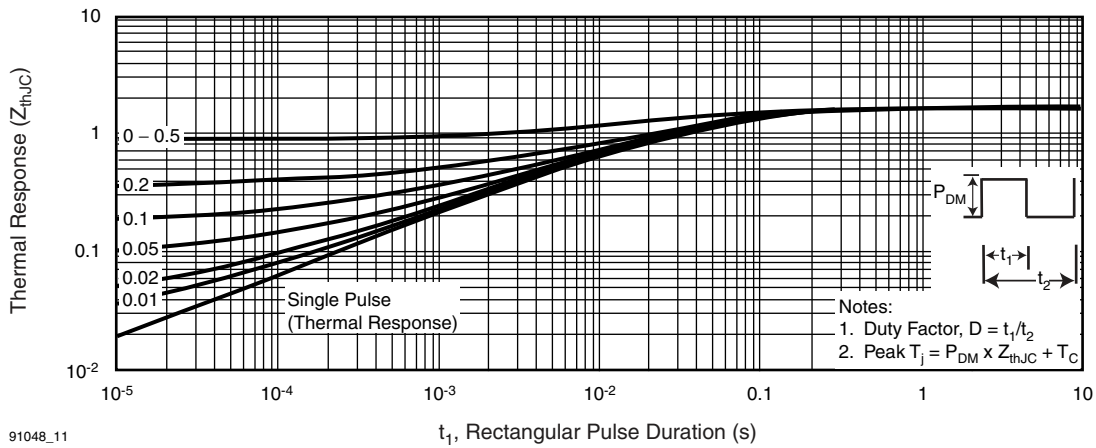


Fig. 10a - Switching Time Test Circuit



Fig. 10b - Switching Time Waveforms



91048_11

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

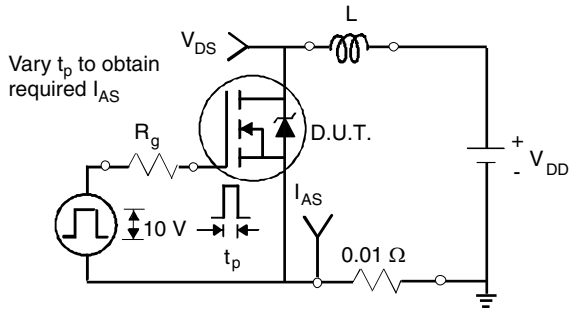
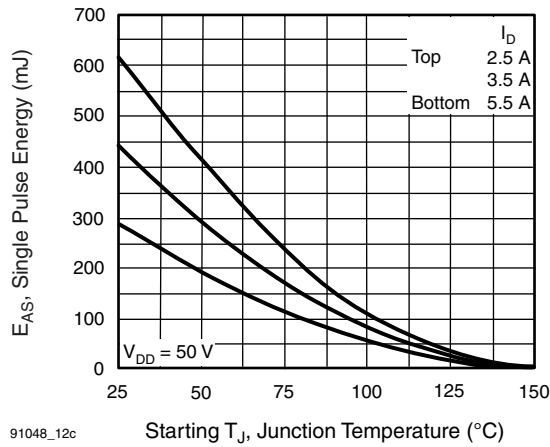


Fig. 12a - Unclamped Inductive Test Circuit



Fig. 12b - Unclamped Inductive Waveforms



91048_12c

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

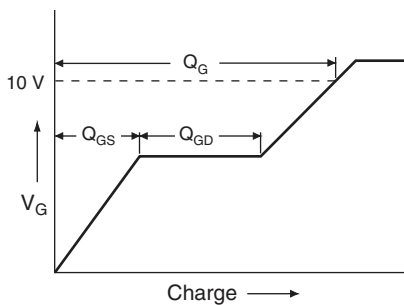


Fig. 13a - Basic Gate Charge Waveform

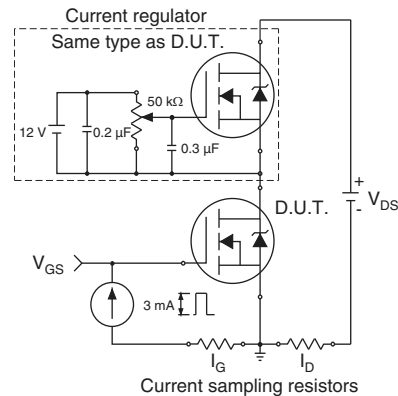
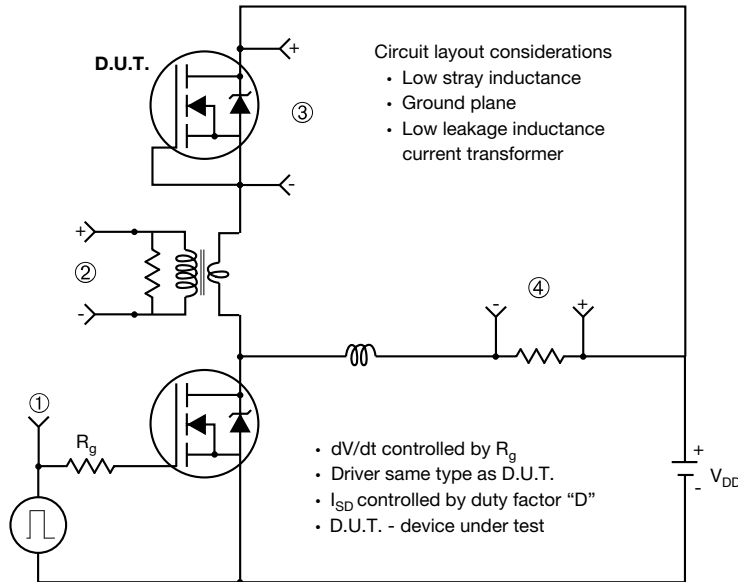


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit



Note

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

Fig. 14 - For N-Channel

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