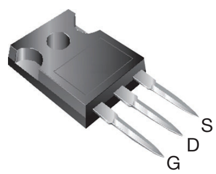
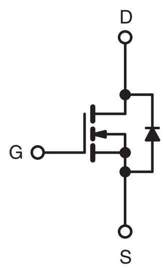
Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	1000	
$R_{DS(on)}$ (Ω)	V_{GS} = 10 V	3.5
Q_g (Max.) (nC)	120	
Q_{gs} (nC)	16	
Q_{gd} (nC)	65	
Configuration	Single	

TO-247AC





N-Channel MOSFET

FEATURES

- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- Isolated Central Mounting Hole
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Compliant to RoHS Directive 2002/95/EC

Pb Available RoHS* COMPLIANT

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 TO-247AC package is preferred for commercial-industrial applications where higher power levels preclude the use of TO-220AB devices. The TO-247AC is similar but superior to the earlier TO-218 package because of its isolated mouting hole. It also provides greater creepage distance between pins to meet the requirements of most safety specifications.

ORDERING INFORMATION	
Package	TO-247AC
Lead (Pb)-free	IRFPG40PbF
	SiHFPG40-E3
SnPb	IRFPG40
	SiHFPG40

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

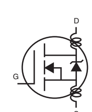
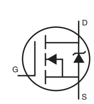
PARAMETER			SYMBOL	LIMIT	UNIT
Drain-Source Voltage			V_{DS}	1000	V
Gate-Source Voltage			V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	T_C = 25 °C	I_D	4.3	A
		T_C = 100 °C		2.7	
Pulsed Drain Current[a]			I_{DM}	17	
Linear Derating Factor				1.2	W/°C
Single Pulse Avalanche Energy[b]			E_{AS}	490	mJ
Repetitive Avalanche Current[a]			I_{AR}	4.3	A
Repetitive Avalanche Energy[a]			E_{AR}	15	mJ
Maximum Power Dissipation	T_C = 25 °C		P_D	150	W
Peak Diode Recovery dV/dt[c]			dV/dt	1.0	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]	
Mounting Torque	6-32 or M3 screw			10	lbf · in
				1.1	N · m

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 = 50 mH, R_g = 25 Ω, I_{AS} = 4.3 A (see fig. 12).
c. $I_{SD} \le 4.3$ A, dI/dt ≤ 100 A/μs, $V_{DD} \le 600$, $T_J \le 150$ °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	R_{thJA}	-	40	°C/W
Case-to-Sink, Flat, Greased Surface	R_{thCS}	0.24	-	
Maximum Junction-to-Case (Drain)	R_{thJC}	-	0.83	

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	1000	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA	-	1.3	-	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} = 1000 V, V_{GS} = 0 V	-	-	100	µA
		V_{DS} = 800V, V_{GS} = 0 V, T_J = 125 °C	-	-	500	
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 10 V; I_D = 2.6 A[b]	-	-	3.5	Ω
Forward Transconductance	g_{fs}	V_{DS} = 50 V, I_D = 2.6 A[b]	33	-	-	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1.0 MHz, see fig. 5	-	1600	-	pF
Output Capacitance	C_{oss}		-	170	-	
Reverse Transfer Capacitance	C_{rss}		-	56	-	
Total Gate Charge	Q_g	V_{GS} = 10 V; I_D = 4.3 A, V_{DS} = 400 V, see fig. 6 and 13[b]	-	-	120	nC
Gate-Source Charge	Q_{gs}		-	-	16	
Gate-Drain Charge	Q_{gd}		-	-	65	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 500 V, I_D = 4.3 A , R_g = 9.1 Ω, R_D = 120 Ω, see fig. 10[b]	-	15	-	ns
Rise Time	t_r		-	33	-	
Turn-Off Delay Time	$t_{d(off)}$		-	100	-	
Fall Time	t_f		-	30	-	
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact 	-	5.0	-	nH
Internal Source Inductance	L_S		-	13	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	4.3	A
Pulsed Diode Forward Current[a]	I_{SM}		-	-	17	
Body Diode Voltage	V_{SD}	T_J = 25 °C, I_S = 4.3 A, V_{GS} = 0 V[b]	-	-	1.8	V
Body Diode Reverse Recovery Time	t_{rr}	T_J = 25 °C, I_F = 4.3 A, dI/dt = 100 A/µs[b]	-	470	710	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	1.9	2.9	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 %.

Document Number: 91253
S11-0441-Rev. B, 14-Mar-11

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

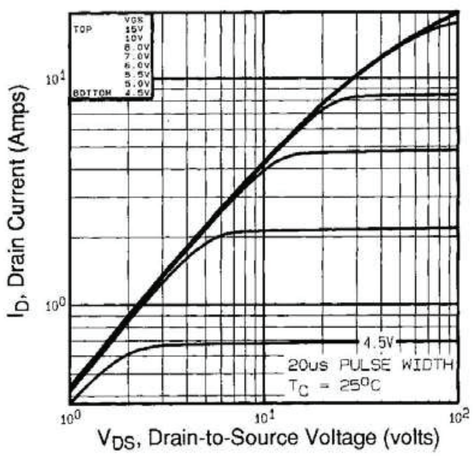


Fig. 1 - Typical Output Characteristics, T_C = 25 °C

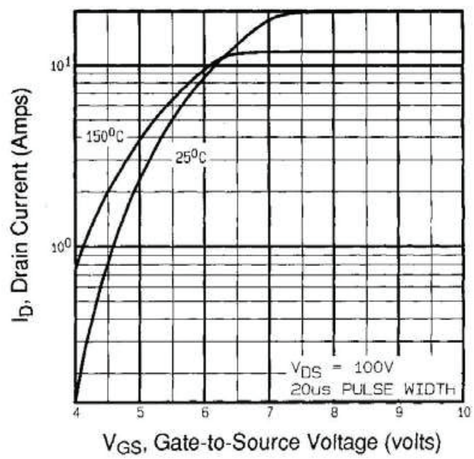


Fig. 3 - Typical Transfer Characteristics

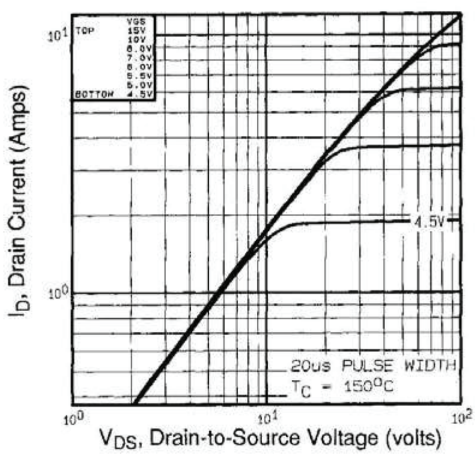


Fig. 2 - Typical Output Characteristics, T_C = 150 °C

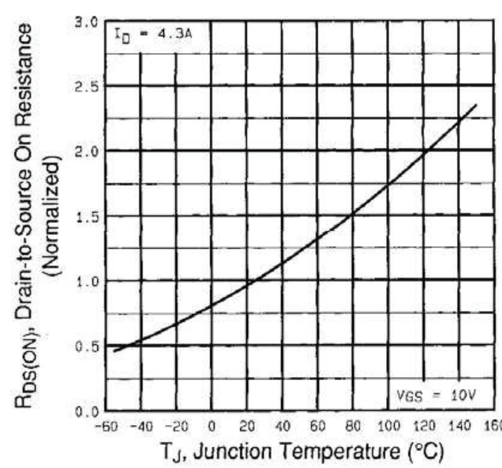


Fig. 4 - Normalized On-Resistance vs. Temperature

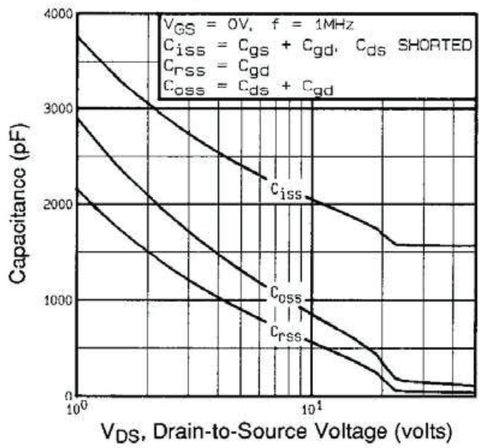


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

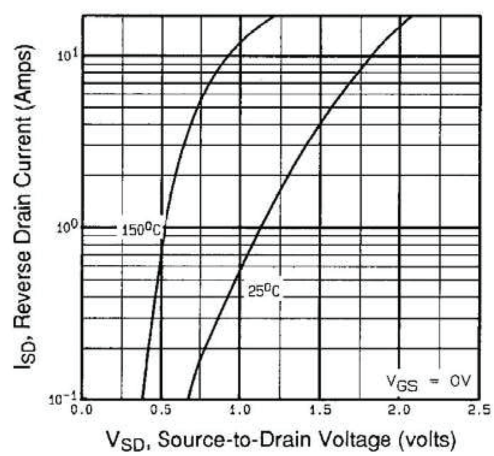


Fig. 7 - Typical Source-Drain Diode Forward Voltage

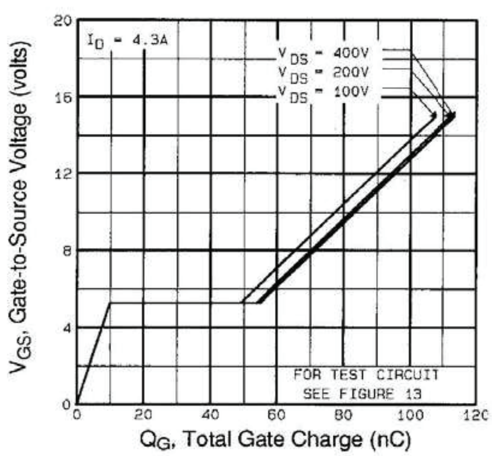


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

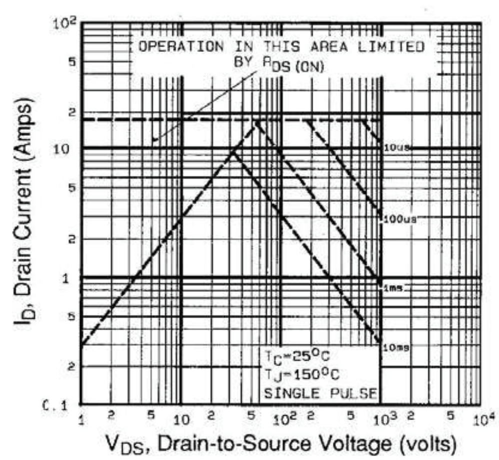


Fig. 8 - Maximum Safe Operating Area

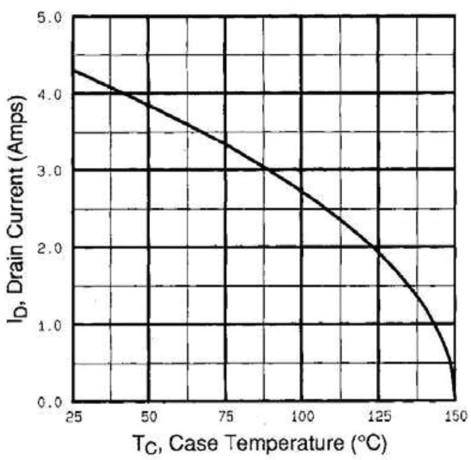


Fig. 9 - Maximum Drain Current vs. Case Temperature

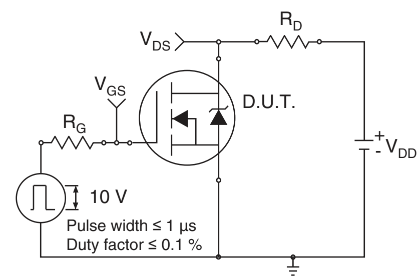


Fig. 10a - Switching Time Test Circuit

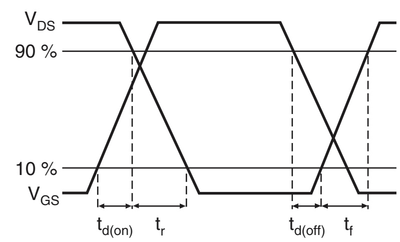


Fig. 10b - Switching Time Waveforms

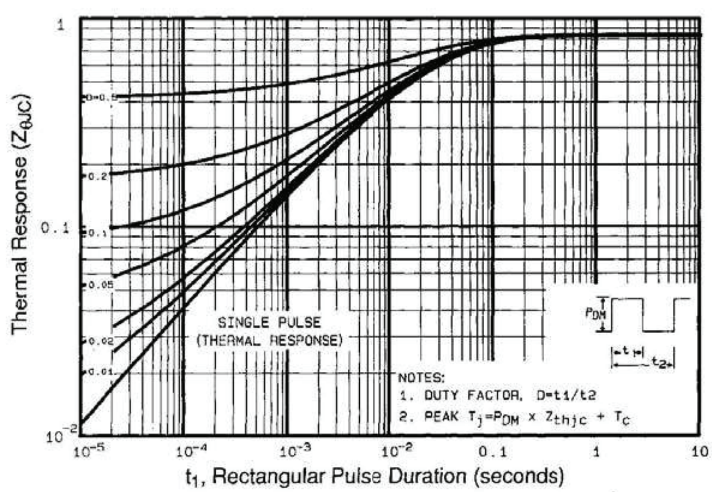


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

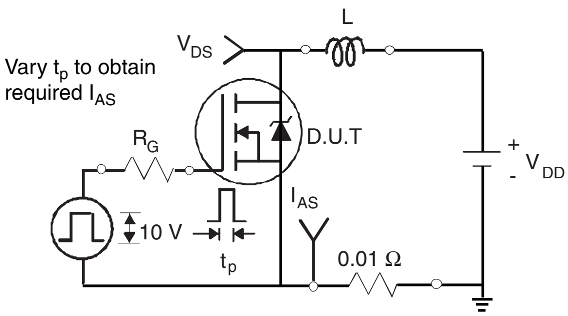


Fig. 12a - Unclamped Inductive Test Circuit

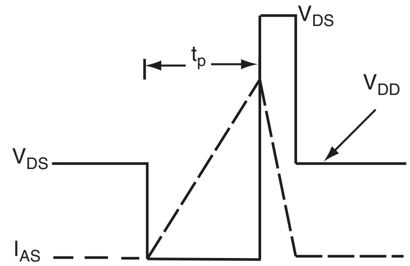


Fig. 12b - Unclamped Inductive Waveforms

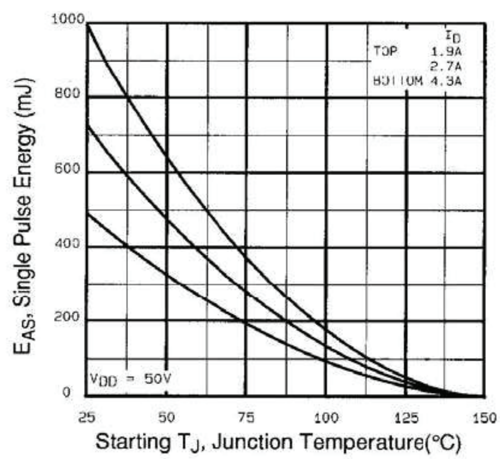


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

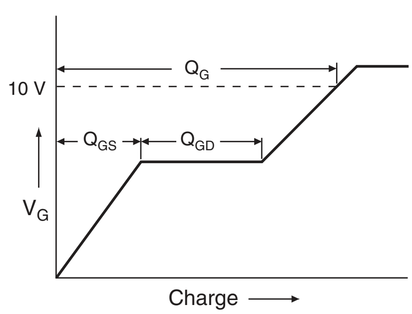


Fig. 13a - Basic Gate Charge Waveform

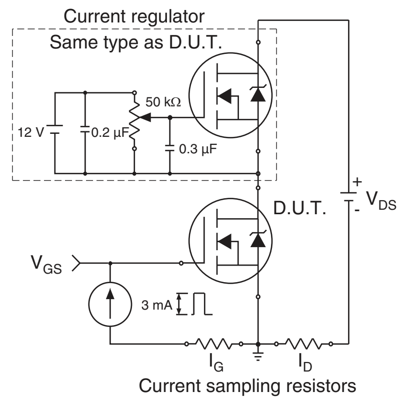
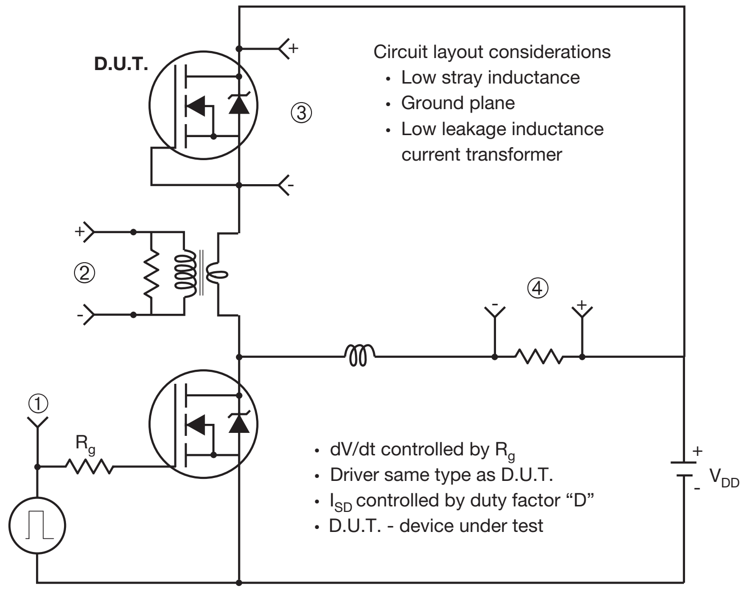
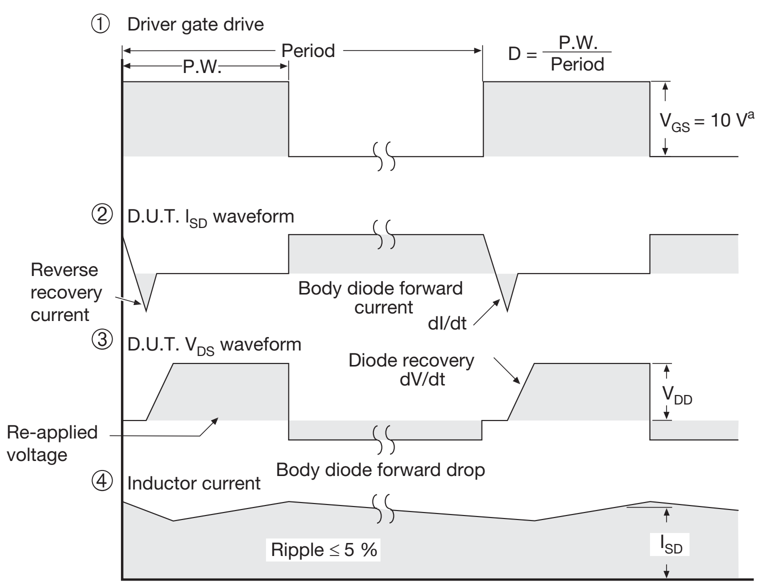


Fig. 13b - Gate Charge Test Circuit

Peak Diode Recovery dV/dt Test Circuit





Note

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

Fig.14 - For N-Channel

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