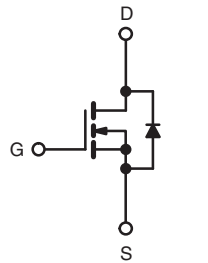
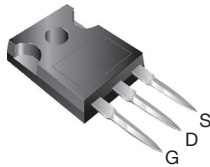


Power MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	1000
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$ 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


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 mounting 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

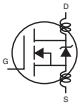

ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Drain-Source Voltage		V_{DS}	1000	V	
Gate-Source Voltage		V_{GS}	± 20		
Continuous Drain Current	V_{GS} at 10 V	I_D	$T_C = 25\text{ }^\circ\text{C}$	4.3	A
			$T_C = 100\text{ }^\circ\text{C}$	2.7	
Pulsed Drain Current ^a		I_{DM}	17		
Linear Derating Factor			1.2	W/ $^\circ\text{C}$	
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	$T_C = 25\text{ }^\circ\text{C}$	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	$^\circ\text{C}$	
Soldering Recommendations (Peak Temperature)	for 10 s		300 ^d		
Mounting Torque	6-32 or M3 screw		10		lbf · in
			1.1	N · m	

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 50\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 4.3\text{ A}$ (see fig. 12).
- $I_{SD} \leq 4.3\text{ A}$, $dI/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq 600$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 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	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 ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	1000	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}$	-	1.3	-	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}	$V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 1000\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	100	μA
		$V_{DS} = 800\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$	-	-	500	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ $I_D = 2.6\text{ A}^b$	-	-	3.5	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 2.6\text{ A}^b$	33	-	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1.0\text{ MHz}$, see fig. 5	-	1600	-	pF
Output Capacitance	C_{oss}		-	170	-	
Reverse Transfer Capacitance	C_{rss}		-	56	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$ $I_D = 4.3\text{ A}$, $V_{DS} = 400\text{ V}$, see fig. 6 and 13 ^b	-	-	120	nC
Gate-Source Charge	Q_{gs}		-	-	16	
Gate-Drain Charge	Q_{gd}		-	-	65	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 500\text{ V}$, $I_D = 4.3\text{ A}$, $R_g = 9.1\text{ }\Omega$, $R_D = 120\text{ }\Omega$, 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}	$T_J = 25\text{ }^\circ\text{C}$, $I_S = 4.3\text{ A}$, $V_{GS} = 0\text{ V}^b$	-	-	1.8	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}$, $I_F = 4.3\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}^b$	-	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 $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

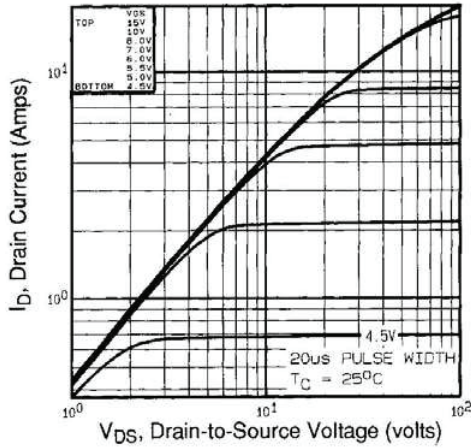


Fig. 1 - Typical Output Characteristics, $T_C = 25\text{ }^\circ\text{C}$

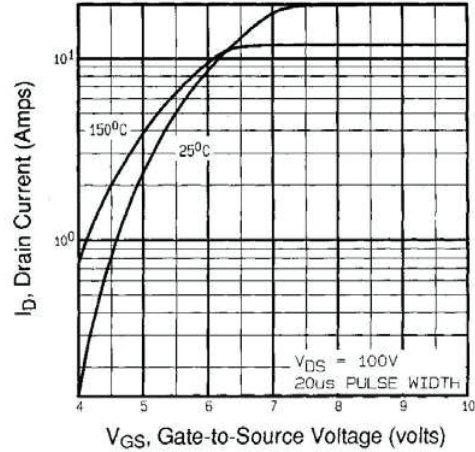


Fig. 3 - Typical Transfer Characteristics

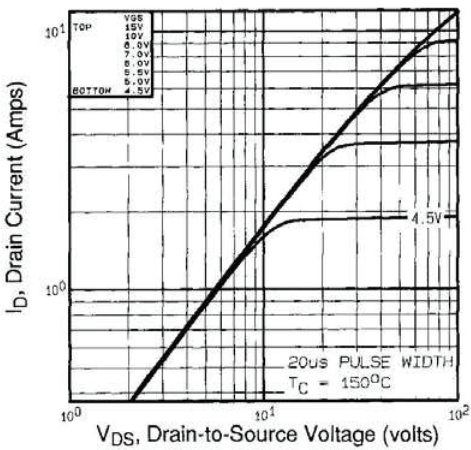


Fig. 2 - Typical Output Characteristics, $T_C = 150\text{ }^\circ\text{C}$

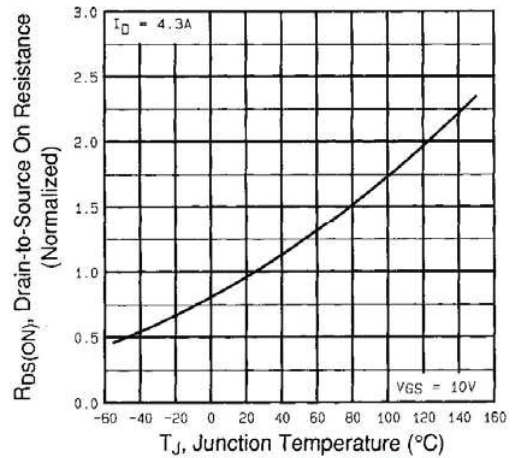


Fig. 4 - Normalized On-Resistance vs. Temperature

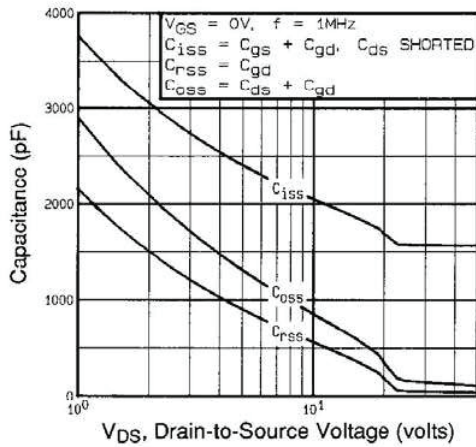


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

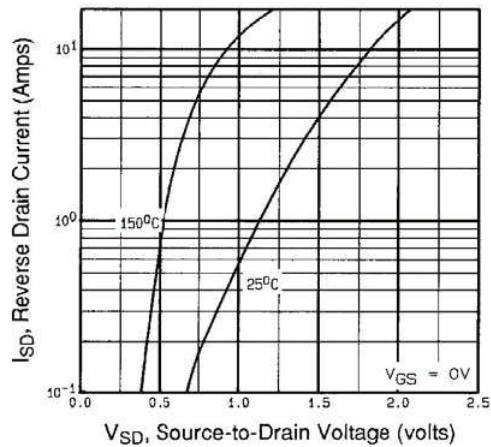


Fig. 7 - Typical Source-Drain Diode Forward Voltage

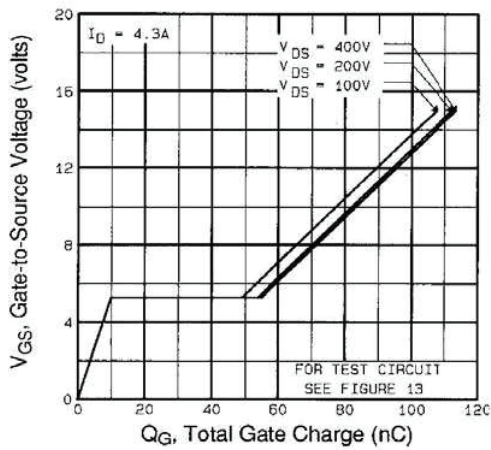


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

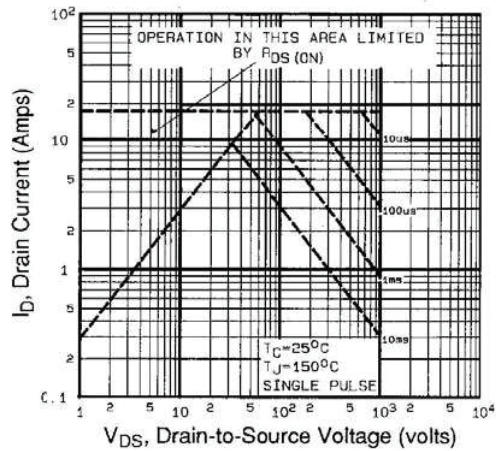


Fig. 8 - Maximum Safe Operating Area

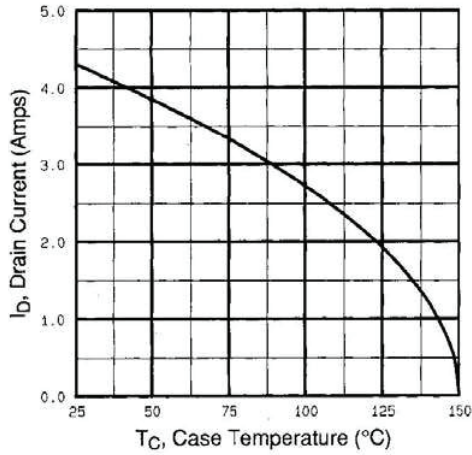


Fig. 9 - Maximum Drain Current vs. Case Temperature



Fig. 10a - Switching Time Test Circuit



Fig. 10b - Switching Time Waveforms

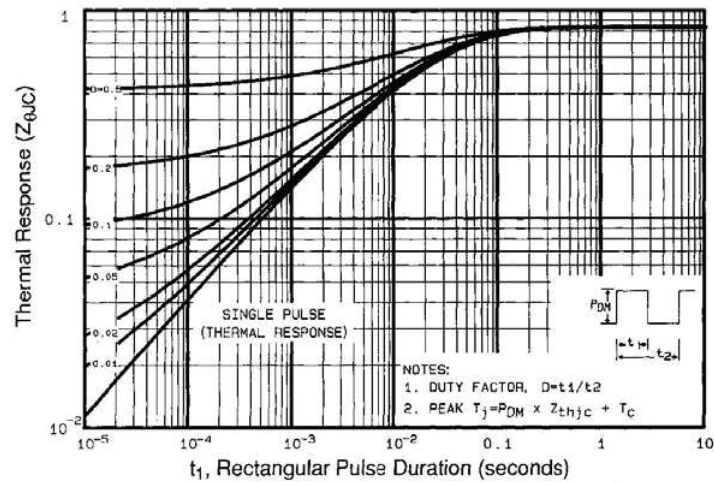


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

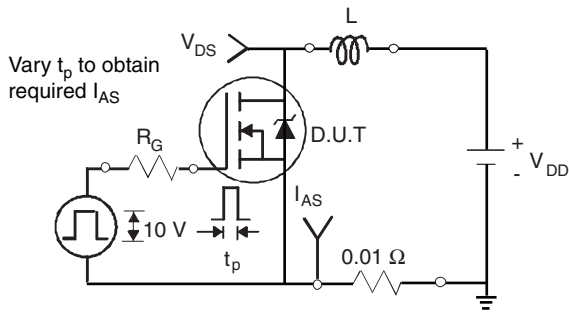


Fig. 12a - Unclamped Inductive Test Circuit



Fig. 12b - Unclamped Inductive Waveforms

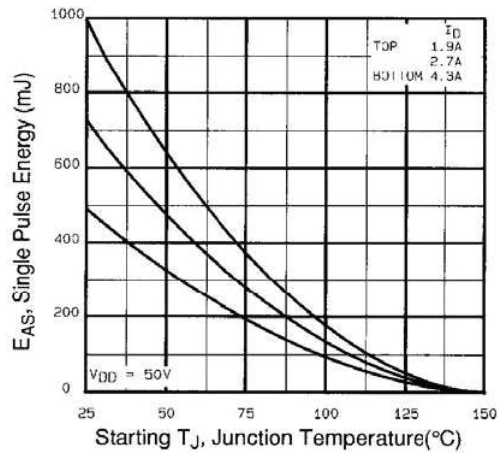


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

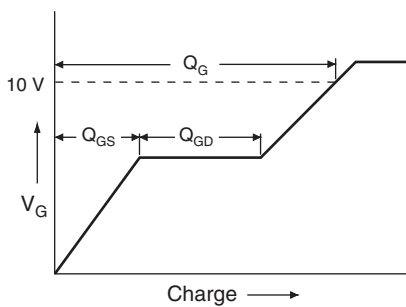


Fig. 13a - Basic Gate Charge Waveform

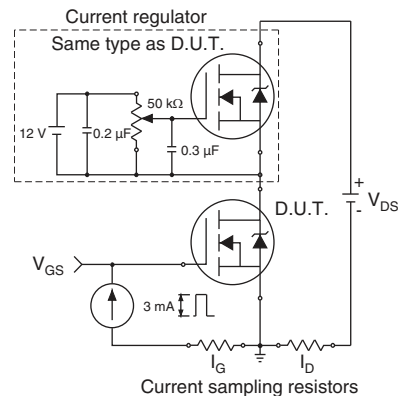
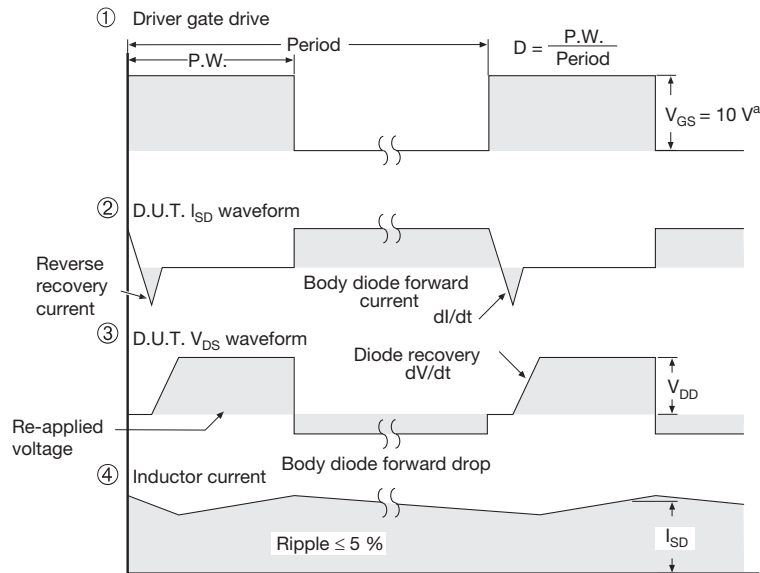
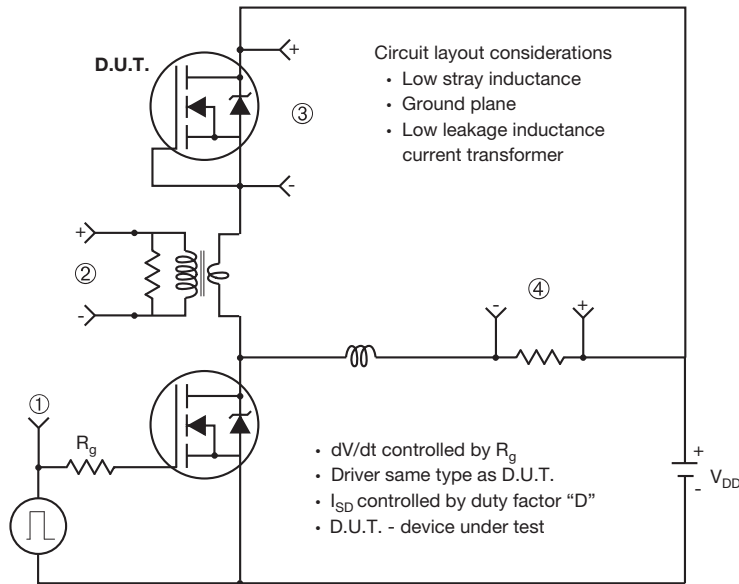


Fig. 13b - Gate Charge Test Circuit

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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