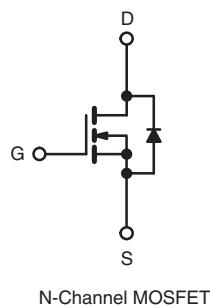
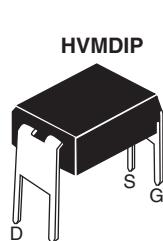


Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	500	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V	3.0
Q_g (Max.) (nC)	24	
Q_{gs} (nC)	3.3	
Q_{gd} (nC)	13	
Configuration	Single	



ORDERING INFORMATION

Package	HVMDIP
Lead (Pb)-free	IRFD420PbF
	SiHFD420-E3
SnPb	IRFD420
	SiHFD420

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	500	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	I_D at $T_A = 25$ °C	A
		at $T_A = 100$ °C	
Pulsed Drain Current ^a	I_{DM}	3.0	
Linear Derating Factor		0.0083	W/°C
Single Pulse Avalanche Energy ^b	E_{AS}	51	mJ
Repetitive Avalanche Current ^a	I_{AR}	0.37	A
Repetitive Avalanche Energy ^a	E_{AR}	0.10	mJ
Maximum Power Dissipation	P_D	1.0	W
Peak Diode Recovery dV/dt ^c	dV/dt	3.5	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

a. Repetitive rating; pulse width limited by maximum junction temperature.

b. $V_{DD} = 50$ V, starting $T_J = 25$ °C, $L = 40$ mH, $R_g = 25$ Ω, $I_{AS} = 1.5$ A.

c. $I_{SD} \leq 4.4$ A, $dI/dt \leq 90$ A/μs, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °C.

d. 1.6 mm from case.



RoHS*
COMPLIANT

FEATURES

- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- For Automatic Insertion
- End Stackable
- Fast Switching
- Ease of Parallelizing
- Simple Drive Requirements
- Compliant to RoHS Directive 2002/95/EC

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 4 pin DIP package is a low cost machine-insertable case style which can be stacked in multiple combinations on standard 0.1 inch pin centers. The dual drain serves as a thermal link to the mounting surface for power dissipation levels up to 1 W.

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

THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	120	°C/W

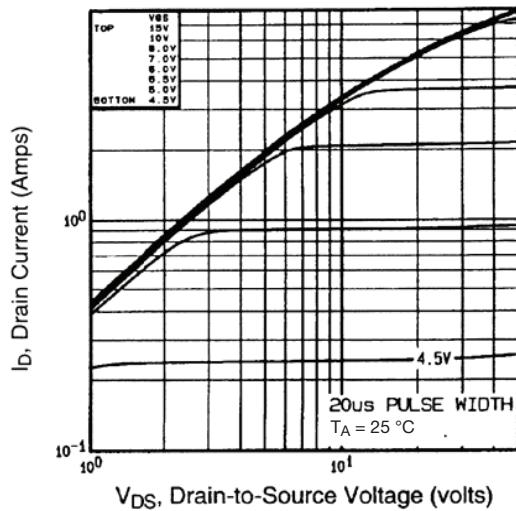
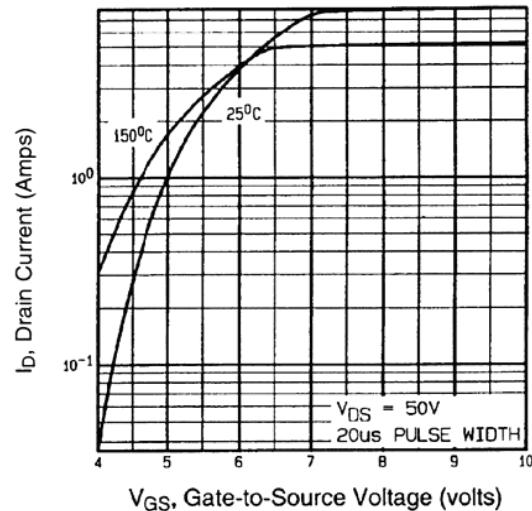
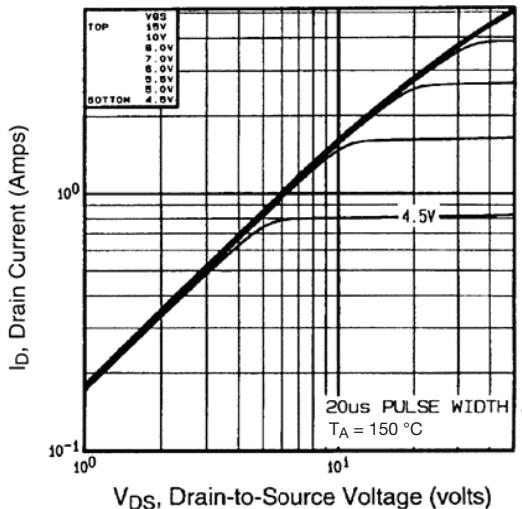
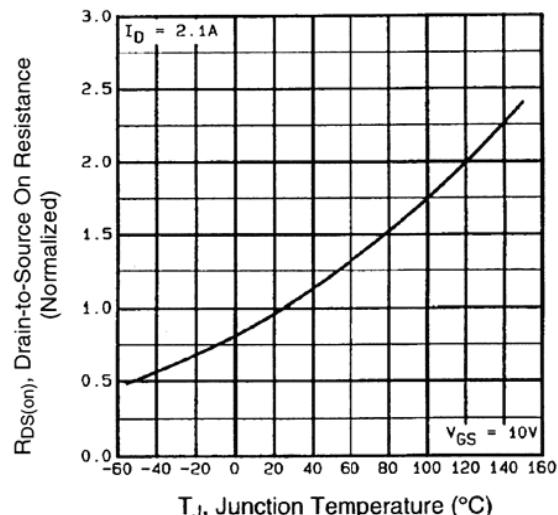
SPECIFICATIONS ($T_J = 25$ °C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0$ V, $I_D = 250$ μ A		500	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, $I_D = 1$ mA		-	0.59	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250$ μ A		2.0	-	4.0	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 20$ V		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 500$ V, $V_{GS} = 0$ V		-	-	25	μ A
		$V_{DS} = 400$ V, $V_{GS} = 0$ V, $T_J = 125$ °C		-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10$ V	$I_D = 0.22$ A ^b	-	-	3.0	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50$ V, $I_D = 1.3$ A ^b		1.5	-	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0$ V, $V_{DS} = 25$ V, $f = 1.0$ MHz		-	360	-	pF
Output Capacitance	C_{oss}			-	92	-	
Reverse Transfer Capacitance	C_{rss}			-	37	-	
Total Gate Charge	Q_g	$V_{GS} = 10$ V	$I_D = 2.1$ A, $V_{DS} = 400$ V ^b	-	-	24	nC
Gate-Source Charge	Q_{gs}			-	-	3.3	
Gate-Drain Charge	Q_{gd}			-	-	13	
Turn-On Delay Time	$t_{d(on)}$			-	8.0	-	
Rise Time	t_r	$V_{DD} = 250$ V, $I_D = 2.1$ A, $R_g = 18$ Ω , $R_D = 120$ Ω ^b		-	8.6	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	33	-		
Fall Time	t_f		-	16	-		
Internal Drain Inductance	L_D		-	4.0	-		
Internal Source Inductance	L_S	Between lead, 6 mm (0.25") from package and center of die contact		-	6.0	-	nH
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	0.37	A
Pulsed Diode Forward Current ^a	I_{SM}			-	-	5.0	
Body Diode Voltage	V_{SD}	$T_J = 25$ °C, $I_S = 0.37$ A, $V_{GS} = 0$ V ^b		-	-	1.6	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25$ °C, $I_F = 2.1$ A, $dI/dt = 100$ A/ μ s ^b		-	260	520	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	0.70	1.4	μ C
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 μ s; duty cycle ≤ 2 %.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

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

Fig. 3 - Typical Transfer Characteristics

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

Fig. 4 - Normalized On-Resistance vs. Temperature

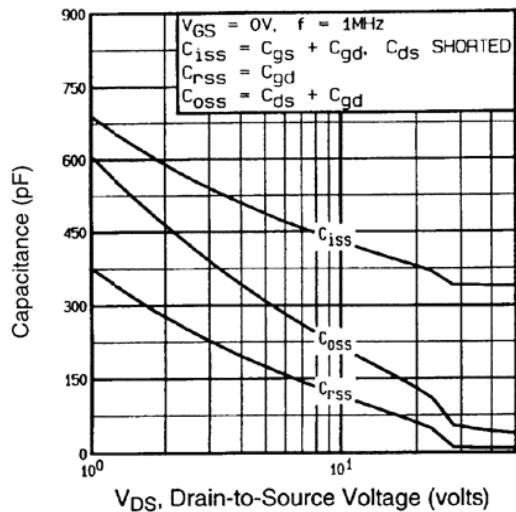


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

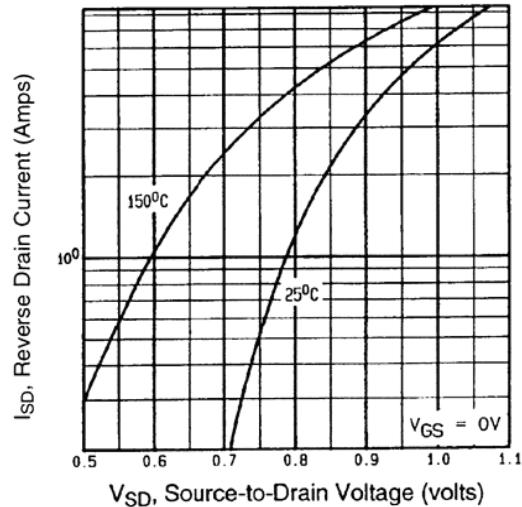


Fig. 7 - Typical Source-Drain Diode Forward Voltage

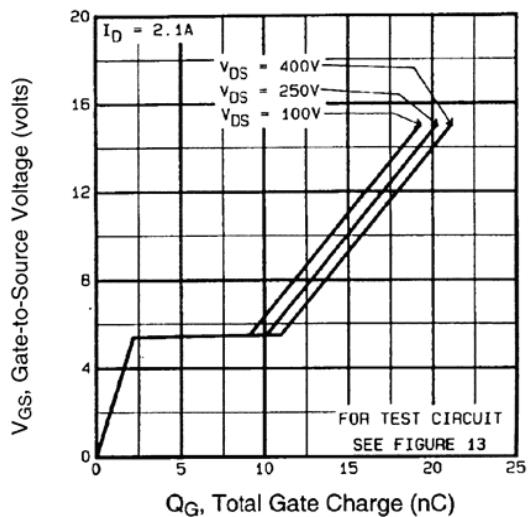


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

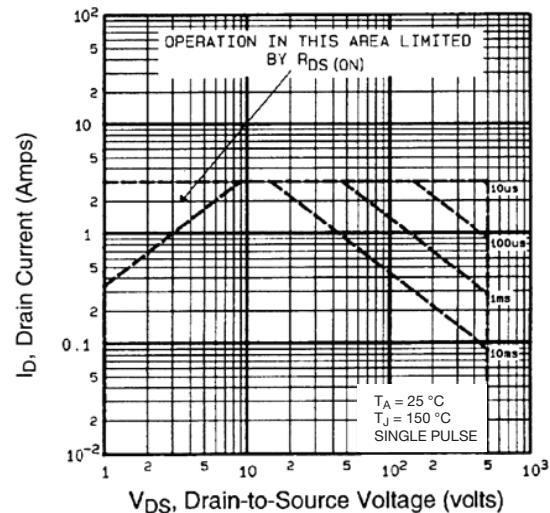


Fig. 8 - Maximum Safe Operating Area

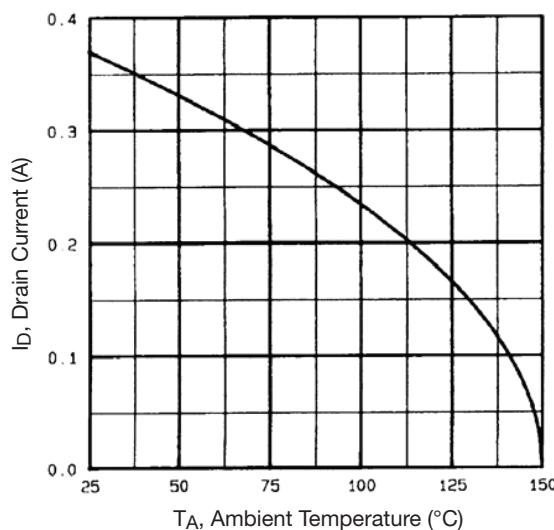


Fig. 9 - Maximum Drain Current vs. Ambient Temperature

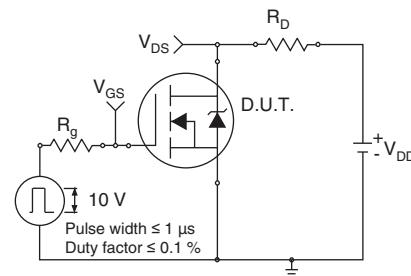


Fig. 10a - Switching Time Test Circuit

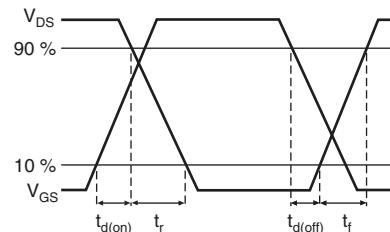


Fig. 10b - Switching Time Waveforms

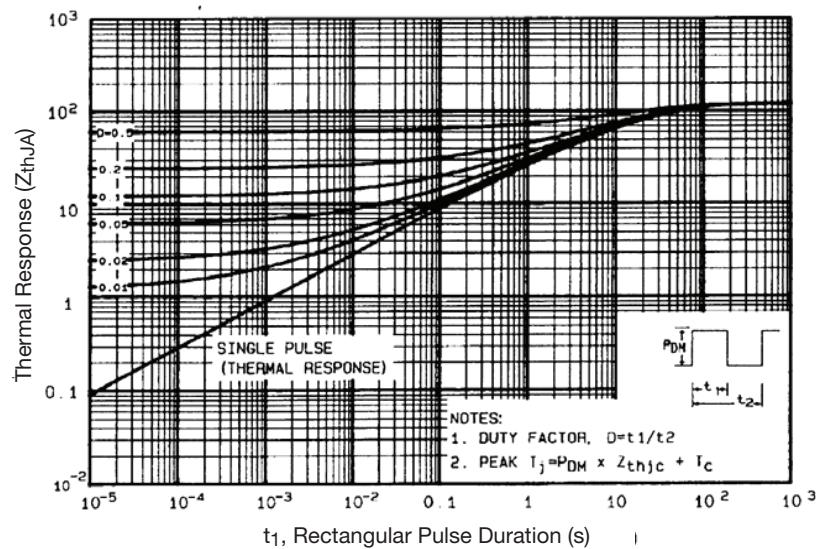


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

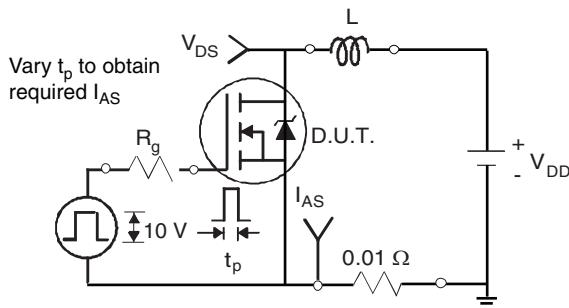


Fig. 12a - Unclamped Inductive Test Circuit

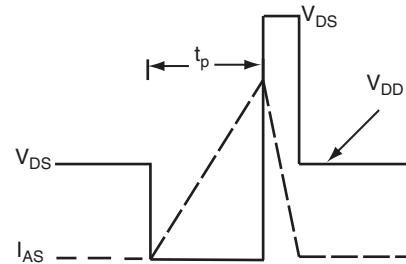


Fig. 12b - Unclamped Inductive Waveforms

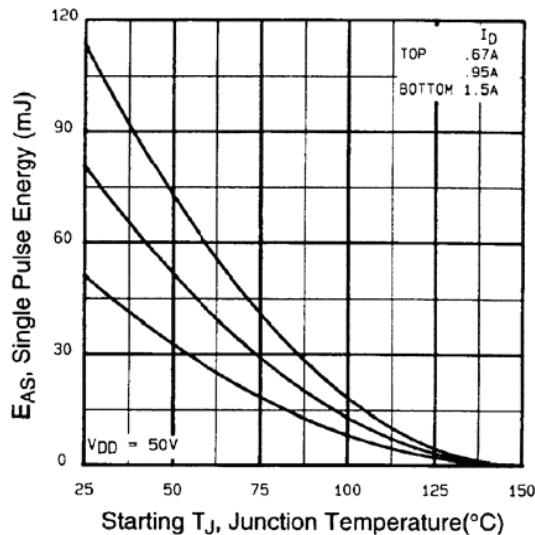


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

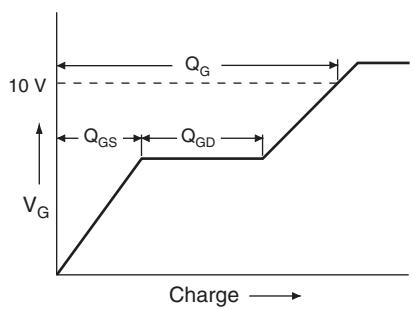


Fig. 13a - Basic Gate Charge Waveform

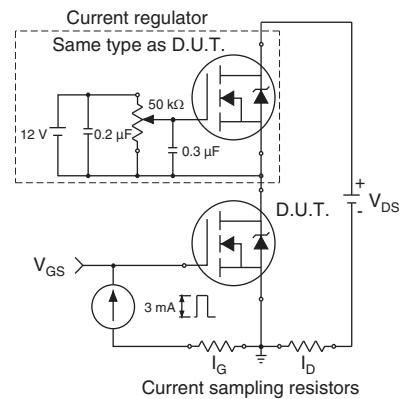
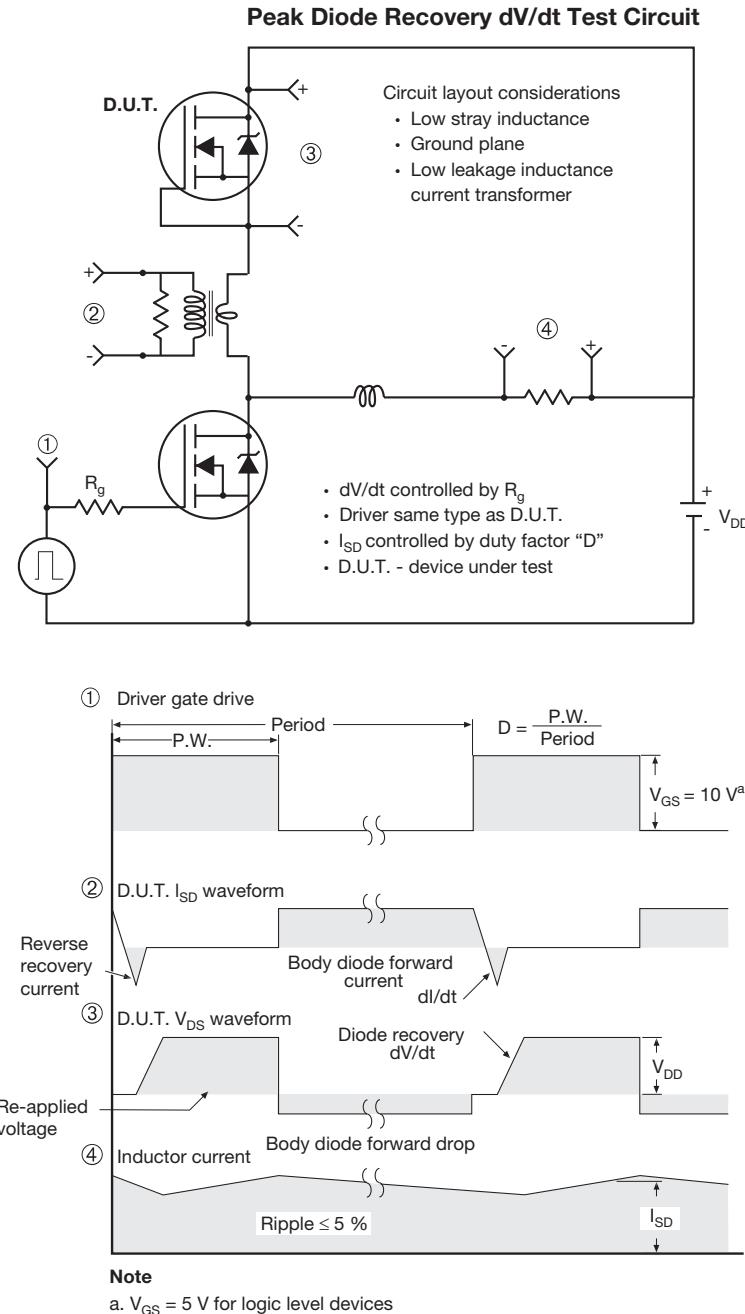
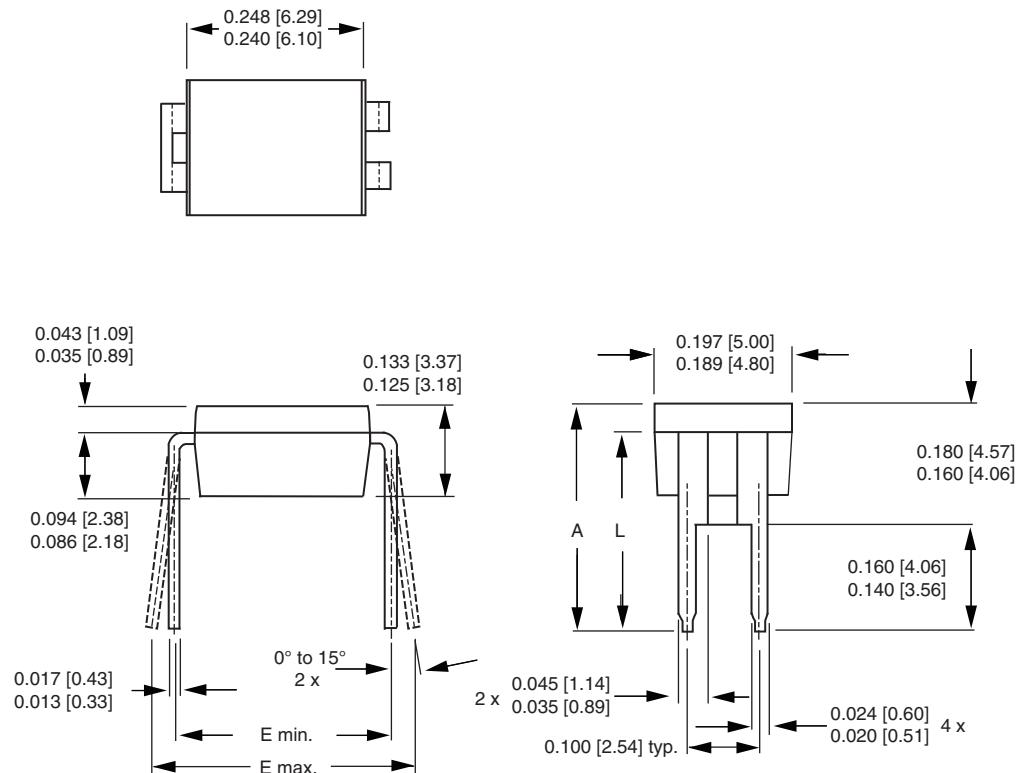


Fig. 13b - Gate Charge Test Circuit


Fig. 14 - For N-Channel

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HVM DIP (High voltage)



DIM.	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.310	0.330	7.87	8.38
E	0.300	0.425	7.62	10.79
L	0.270	0.290	6.86	7.36

ECN: X10-0386-Rev. B, 06-Sep-10
DWG: 5974

Note

1. Package length does not include mold flash, protrusions or gate burrs. Package width does not include interlead flash or protrusions.

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