

IRFDC20PBF Datasheet

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DiGi Electronics Part Number	IRFDC20PBF-DG
Manufacturer	Vishay Siliconix
Manufacturer Product Number	IRFDC20PBF
Description	MOSFET N-CH 600V 320MA 4DIP
Detailed Description	N-Channel 600 V 320mA (Ta) 1W (Ta) Through Hole 4-HVMDIP



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Purchase and inquiry

Manufacturer Product Number:

IRFDC20PBF

Series:

-

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

600 V

Drive Voltage (Max Rds On, Min Rds On):

10V

Vgs(th) (Max) @ Id:

4V @ 250µA

Vgs (Max):

±20V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

4-HVMDIP

Base Product Number:

IRFDC20

Manufacturer:

Vishay Siliconix

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

320mA (Ta)

Rds On (Max) @ Id, Vgs:

4.4Ohm @ 190mA, 10V

Gate Charge (Qg) (Max) @ Vgs:

18 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

350 pF @ 25 V

Power Dissipation (Max):

1W (Ta)

Mounting Type:

Through Hole

Package / Case:

4-DIP (0.300", 7.62mm)

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

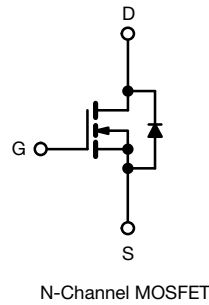
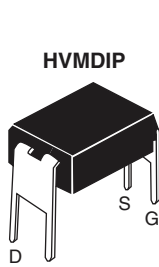
1 (Unlimited)

ECCN:

EAR99



Power MOSFET



FEATURES

- Dynamic dV/dt rating
- Repetitive avalanche rated
- For automatic insertion
- End stackable
- Fast switching
- Ease of paralleling
- Simple drive requirements
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

PRODUCT SUMMARY

V_{DS} (V)	600	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V	4.4
Q_g (Max.) (nC)	18	
Q_{gs} (nC)	3.0	
Q_{gd} (nC)	8.9	
Configuration	Single	

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" pin centers. The dual drain serves as a thermal link to the mounting surface for power dissipation levels up to 1 W.

ORDERING INFORMATION

Package	HVMDIP
Lead (Pb)-free	IRFDC20PbF

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

PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	V_{DS}	600	V	
Gate-source voltage	V_{GS}	± 20		
Continuous drain current	V_{GS} at -10 V	$T_A = 25$ °C	A	
		$T_A = 100$ °C		
Pulsed drain current ^a	I_{DM}	2.6		
Linear derating factor		0.0083	W/°C	
Single pulse avalanche energy ^b	E_{AS}	50	mJ	
Repetitive avalanche current ^a	I_{AR}	0.32	A	
Repetitive avalanche energy ^a	E_{AR}	0.10	mJ	
Maximum power dissipation	$T_A = 25$ °C	P_D	1.0	W
Peak diode recovery dv/dt ^c		dV/dt	3.0	V/ns
Operating junction and storage temperature range		T_J, T_{stg}	- 55 to + 150	°C
Soldering rRecommendations (peak temperature) ^d	For 10 s		300 ^d	

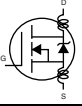

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
- $V_{DD} = 50$ V, starting $T_J = 25$ °C, $L = 54$ mH, $R_g = 25$ Ω , $I_{AS} = 1.3$ A (see fig. 12)
- $I_{SD} \leq 4.4$ A, $dI/dt \leq 90$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °C
- 1.6 mm from case

**THERMAL RESISTANCE RATINGS**

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

SPECIFICATIONS ($T_J = 25\text{ °C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	600	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C , $I_D = 1\text{ mA}$	-	0.88	-	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}	$V_{DS} = 600\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	25	μA
		$V_{DS} = 480\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ °C}$	-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ $I_D = 0.19\text{ A}^b$	-	-	4.4	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 1.3\text{ A}^b$	1.4	-	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1.0\text{ MHz}$, see fig. 5	-	350	-	pF
Output Capacitance	C_{oss}		-	48	-	
Reverse Transfer Capacitance	C_{rss}		-	8.6	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$ $I_D = 2.0\text{ A}$, $V_{DS} = 360\text{ V}$, see fig.6 and 13 ^b	-	-	18	nC
Gate-Source Charge	Q_{gs}		-	-	3.0	
Gate-Drain Charge	Q_{gd}		-	-	8.9	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 300\text{ V}$, $I_D = 2.0\text{ A}$, $R_g = 18\text{ }\Omega$, $R_D = 150\text{ }\Omega$, see fig. 10 ^b	-	10	-	ns
Rise Time	t_r		-	23	-	
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	
Fall Time	t_f		-	25	-	
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact 	-	4.0	-	nH
Internal Source Inductance	L_S		-	6.0	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	0.32	A
Pulsed Diode Forward Current ^a	I_{SM}		-	-	2.6	
Body Diode Voltage	V_{SD}	$T_J = 25\text{ °C}$, $I_S = 0.32\text{ A}$, $V_{GS} = 0\text{ V}^b$	-	-	1.6	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ °C}$, $I_F = 2.0\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}^b$	-	290	580	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	0.67	1.3	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)

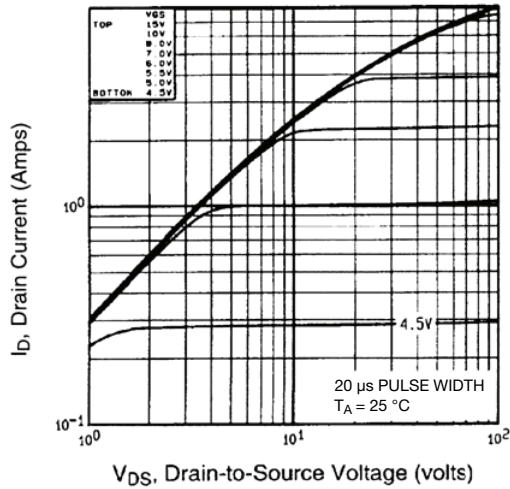


Fig. 1 - Typical Output Characteristics, $T_A = 25^\circ\text{C}$

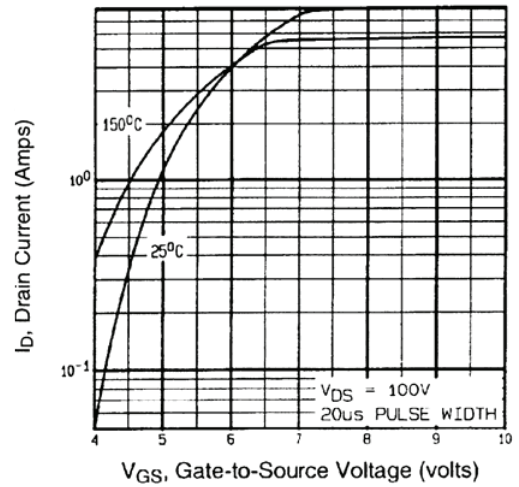


Fig. 3 - Typical Transfer Characteristics

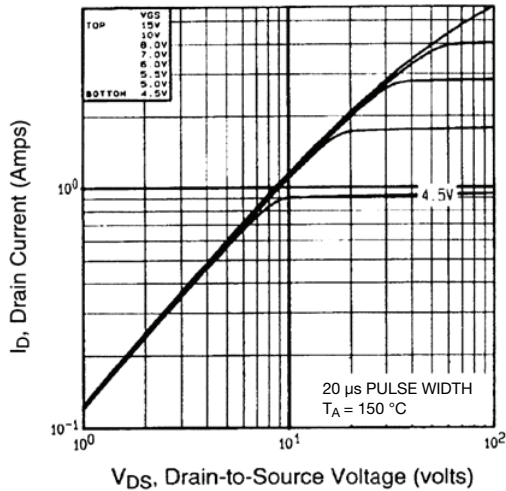


Fig. 2 - Typical Output Characteristics, $T_A = 150^\circ\text{C}$

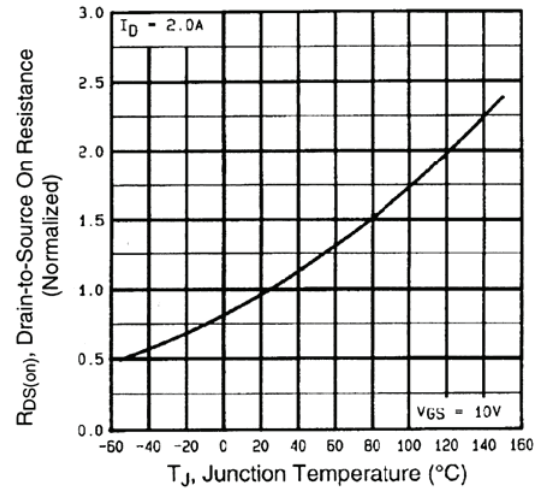


Fig. 4 - Normalized On-Resistance vs. Temperature

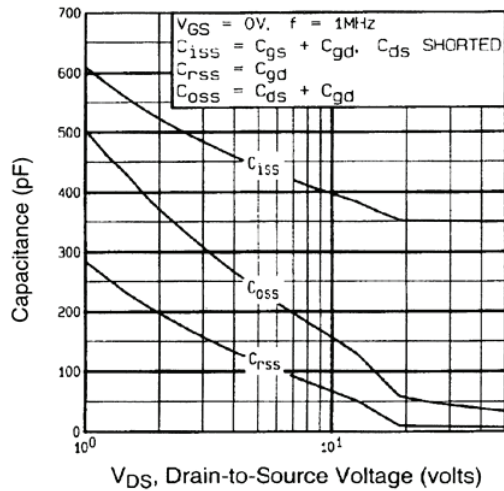


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

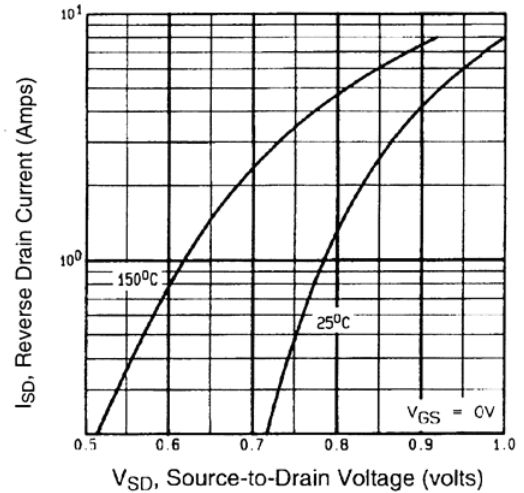


Fig. 7 - Typical Source-Drain Diode Forward Voltage

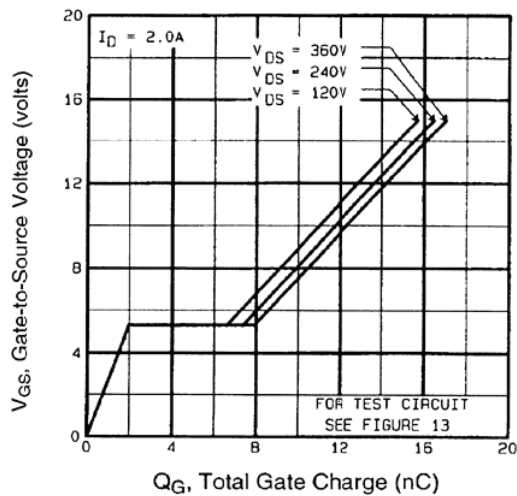


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

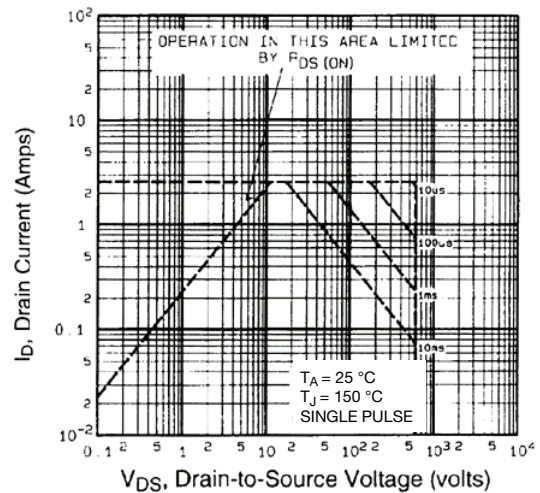


Fig. 8 - Maximum Safe Operating Area

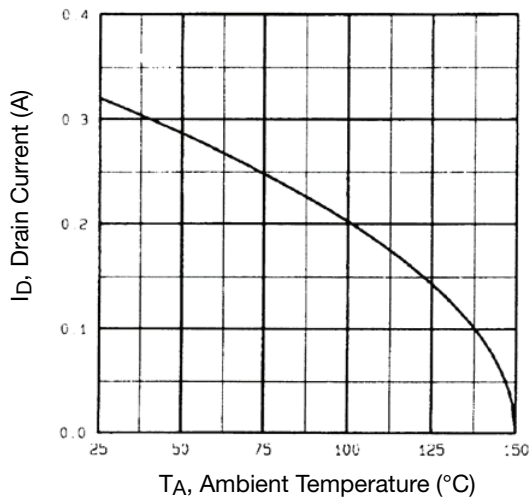


Fig. 9 - Maximum Drain Current vs. Ambient Temperature

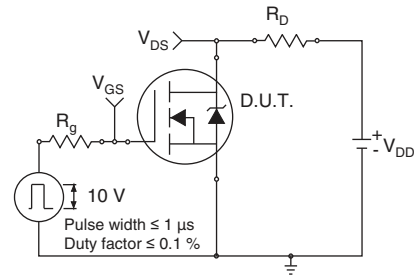


Fig. 10a - Switching Time Test Circuit

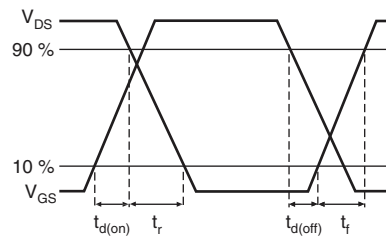


Fig. 10b - Switching Time Waveforms

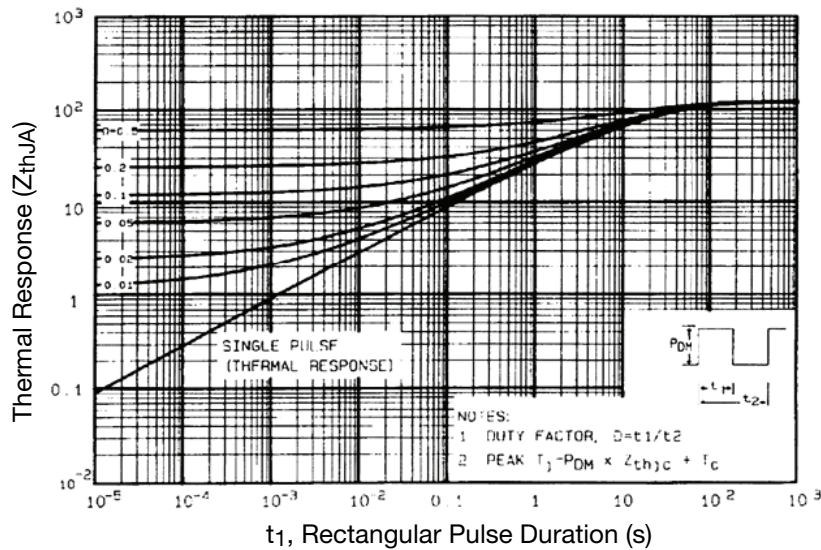


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

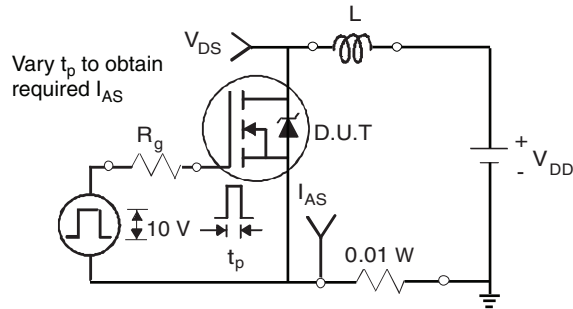


Fig. 12a - Unclamped Inductive Test Circuit

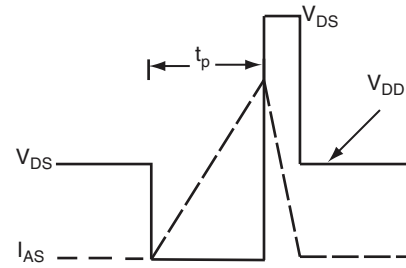


Fig. 12b - Unclamped Inductive Waveforms

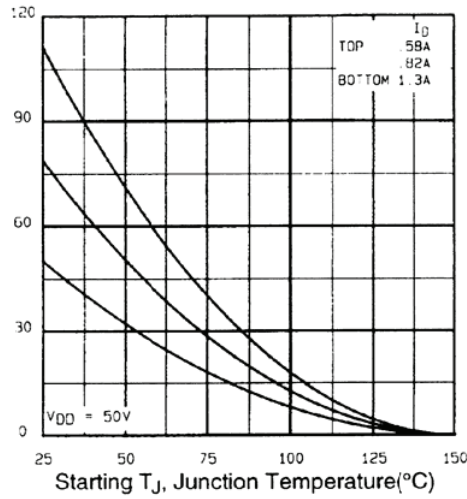


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

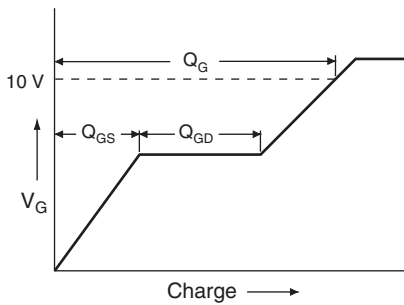


Fig. 13a - Basic Gate Charge Waveform

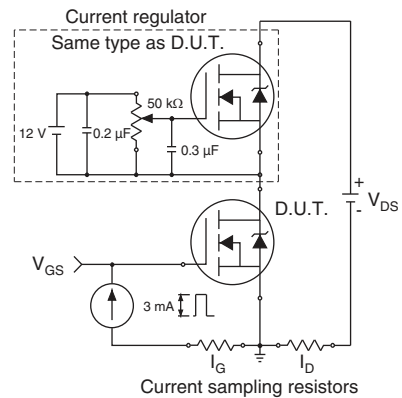
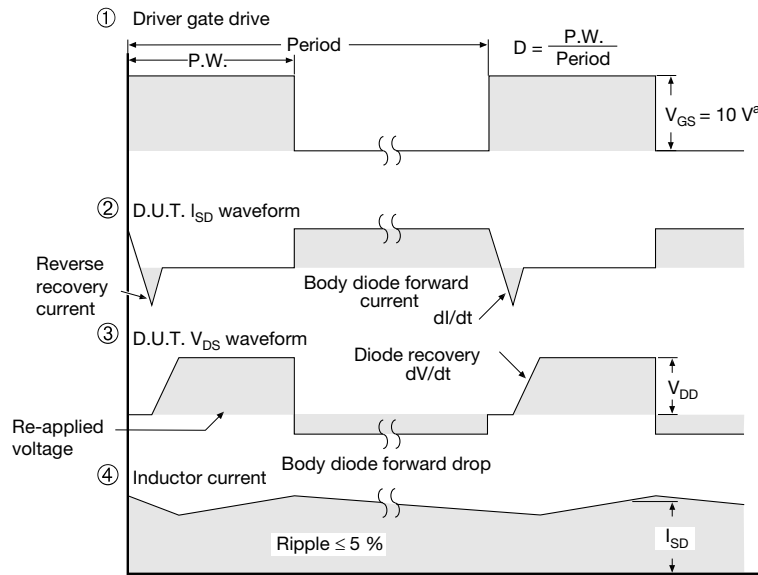
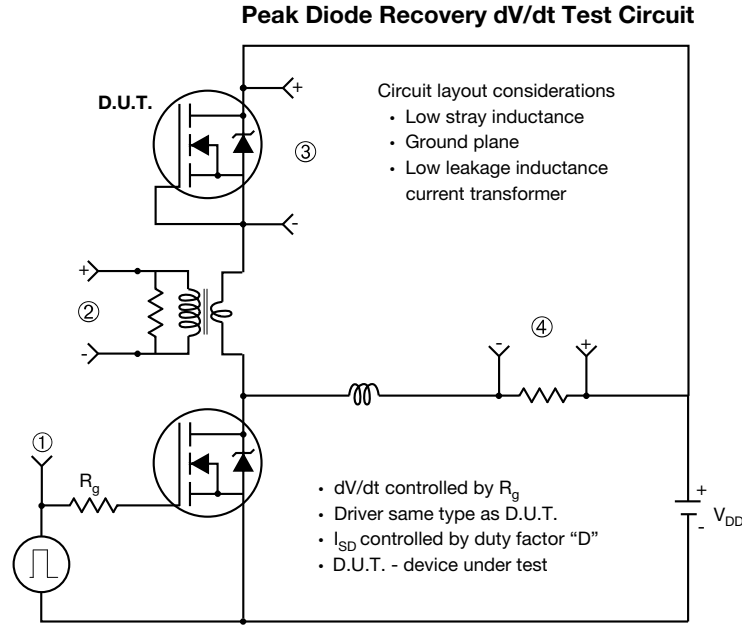


Fig. 13b - Gate Charge Test Circuit



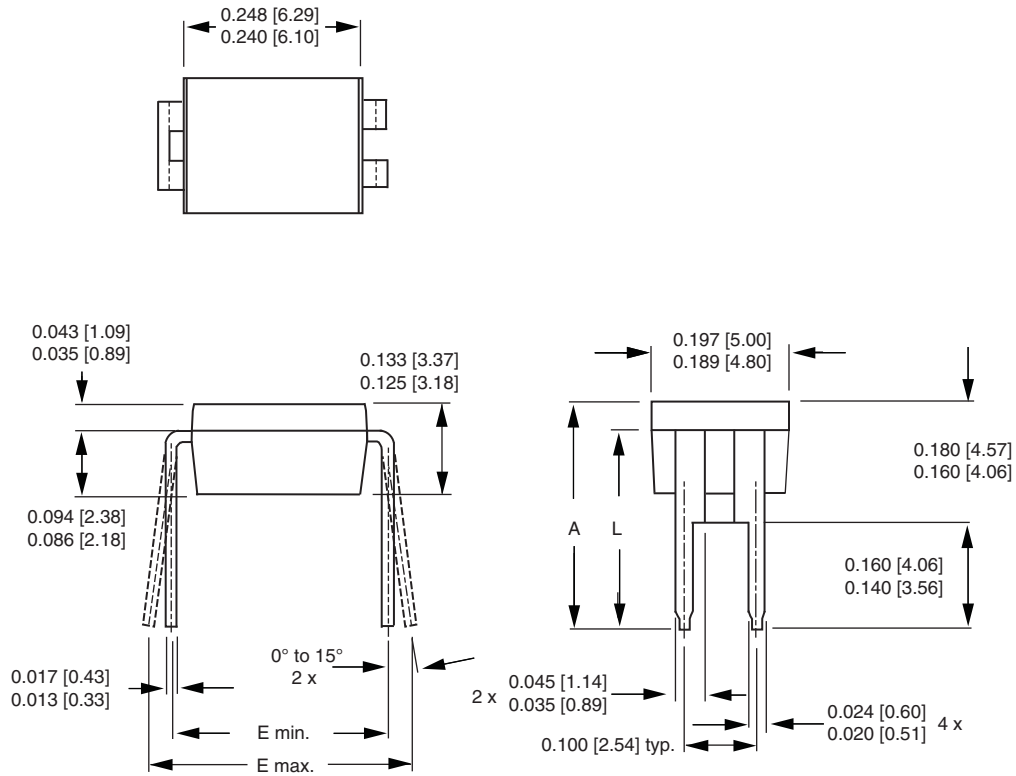
Note
a. $V_{GS} = 5\text{ V}$ for logic level devices

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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