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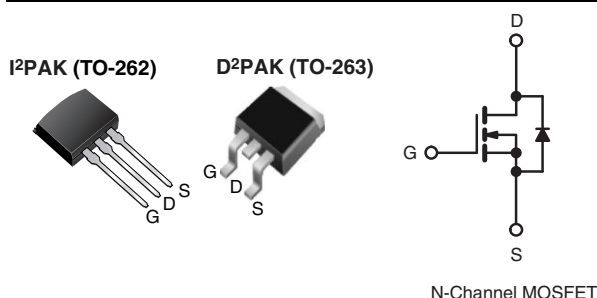


IRF730AS, SiHF730AS, IRF730AL, SiHF730AL

Vishay Siliconix

Power MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	400	
$R_{DS(on)}$ (Max.) (Ω)	$V_{GS} = 10\text{ V}$	1.0
Q_g (Max.) (nC)	22	
Q_{gs} (nC)	5.8	
Q_{gd} (nC)	9.3	
Configuration	Single	



FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- Low Gate Charge Q_g Results in Simple Drive Requirement
- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche Voltage and Current
- Effective C_{oss} Specified
- Compliant to RoHS Directive 2002/95/EC


RoHS*
 COMPLIANT
 HALOGEN
FREE
 Available

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply
- High Speed Power Switching

TYPICAL SMPS TOPOLOGIES

- Single Transistor Flyback Xfmr. Reset
- Single Transistor Forward Xfmr. Reset (Both US Line Input Only)

ORDERING INFORMATION				
Package	D ² PAK (TO-263)	D ² PAK (TO-263)	D ² PAK (TO-263)	I ² PAK (TO-262)
Lead (Pb)-free and Halogen-free	SiHF730AS-GE3	SiHF730ASTRL-GE3 ^a	SiHF730ASTRR-GE3 ^a	SiHF730AL-GE3
Lead (Pb)-free	IRF730ASPbF	IRF730ASTRLPbF ^a	IRF730ASTRRPbF ^a	IRF730ALPbF
	SiHF730AS-E3	SiHF730ASTL-E3 ^a	SiHF730ASTR-E3 ^a	SiHF730AL-E3

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}	± 30	
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, e}			I_{DM}	22	
Linear Derating Factor				0.6	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ^{b, e}			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
Peak Diode Recovery dV/dt ^{c, e}			dV/dt	4.6	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).
- Starting $T_J = 25\text{ }^\circ\text{C}$, $L = 19\text{ mH}$, $R_g = 25\text{ }^\circ\Omega$, $I_{AS} = 5.5\text{ A}$ (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.
- Uses IRF730A, SiHF730A data and test conditions.

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

IRF730AS, SiHF730AS, IRF730AL, SiHF730AL


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THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB Mounted, steady-state) ^a	R_{thJA}	-	40	°C/W
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}	$V_{GS} = 0, I_D = 250\text{ }\mu\text{A}$	400	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}^d$	-	0.5	-	V/°C
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	-	4.5	V
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm 30\text{ V}$	-	-	± 100	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	
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}	$V_{DS} = 50\text{ V}, I_D = 3.3\text{ A}^d$	3.1	-	-	S
Dynamic						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1.0\text{ MHz}, \text{ see fig. } 5^d$	-	600	-	pF
Output Capacitance	C_{oss}		-	103	-	
Reverse Transfer Capacitance	C_{rss}		-	4.0	-	
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 1.0\text{ V}, f = 1.0\text{ MHz}$	-	890	-
			$V_{DS} = 320\text{ V}, f = 1.0\text{ MHz}$	-	30	-
Effective Output Capacitance	$C_{oss\text{ eff.}}$			-	45	-
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}, V_{DS} = 320\text{ V}, \text{ see fig. } 6 \text{ and } 13^b, d$	-	-	22	nC
Gate-Source Charge	Q_{gs}		-	-	5.8	
Gate-Drain Charge	Q_{gd}		-	-	9.3	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 200\text{ V}, I_D = 3.5\text{ A}, R_g = 12\text{ }\Omega, R_D = 57\text{ }\Omega, \text{ see fig. } 10^b, d$	-	10	-	ns
Rise Time	t_r		-	22	-	
Turn-Off Delay Time	$t_{d(off)}$		-	20	-	
Fall Time	t_f		-	16	-	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	5.5	A
Pulsed Diode Forward Current ^a	I_{SM}		-	-	22	
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}	$T_J = 25\text{ }^\circ\text{C}, I_F = 3.5\text{ A}, di/dt = 100\text{ A}/\mu\text{s}^b, d$	-	370	550	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	1.6	2.4	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 $\leq 2\%$.
- $C_{oss\text{ eff.}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0% to 80% V_{DS} .
- Uses IRF730A, SiHF730A data and test conditions.



IRF730AS, SiHF730AS, IRF730AL, SiHF730AL

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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

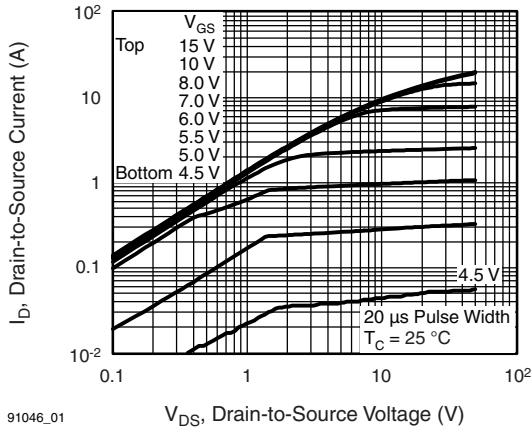


Fig. 1 - Typical Output Characteristics

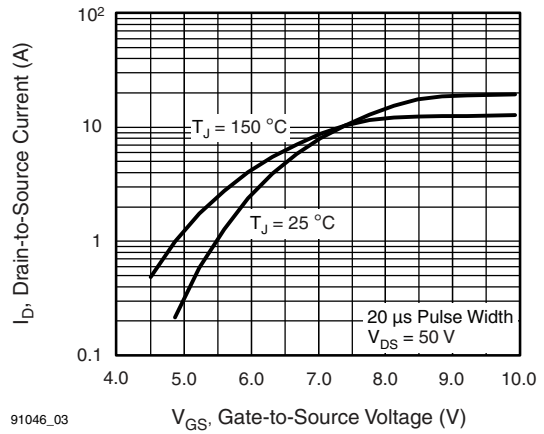


Fig. 3 - Typical Transfer Characteristics

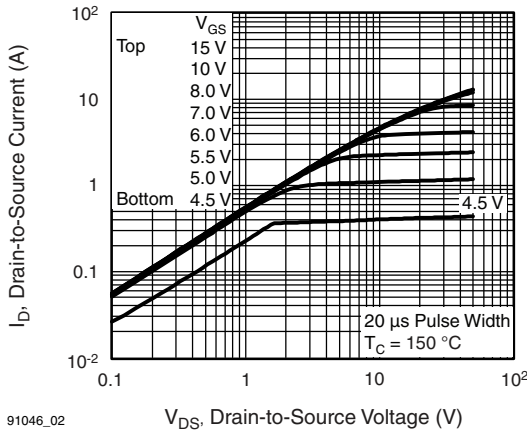


Fig. 2 - Typical Output Characteristics

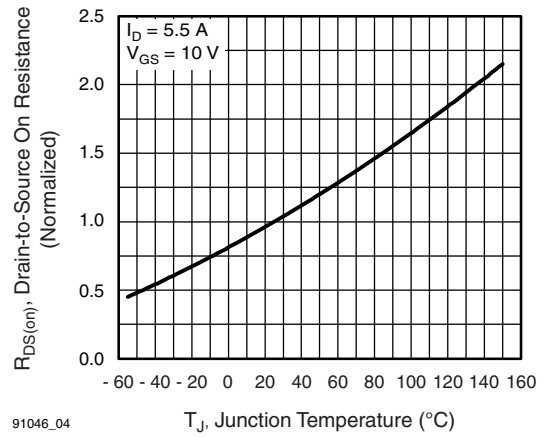
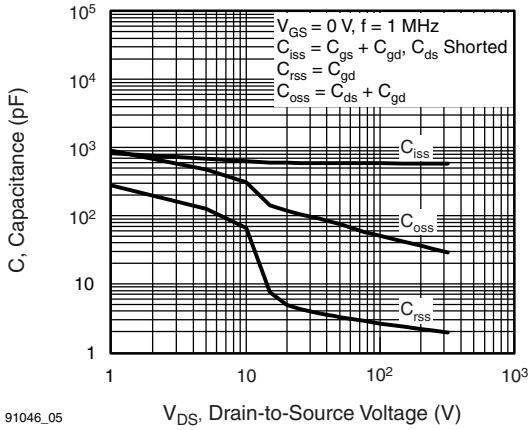


Fig. 4 - Normalized On-Resistance vs. Temperature

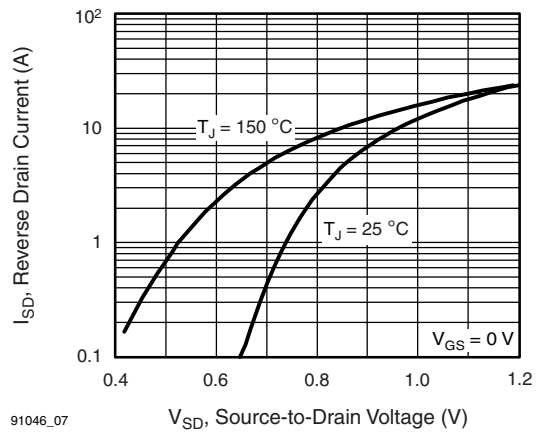
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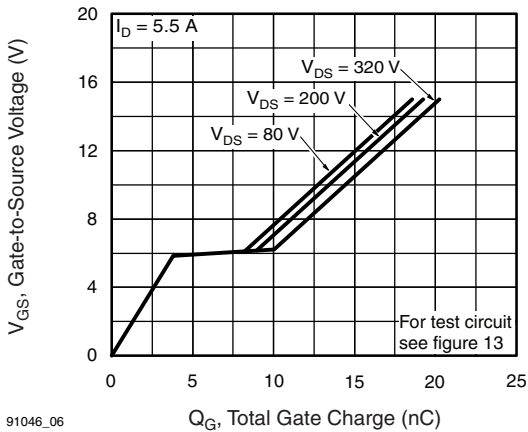
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Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage



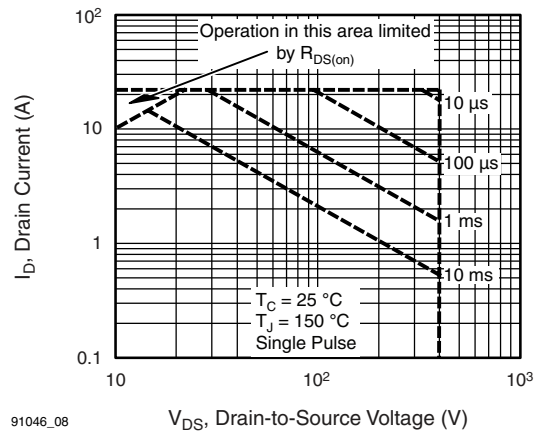
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Fig. 7 - Typical Source-Drain Diode Forward Voltage



91046_06

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



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Fig. 8 - Maximum Safe Operating Area



IRF730AS, SiHF730AS, IRF730AL, SiHF730AL

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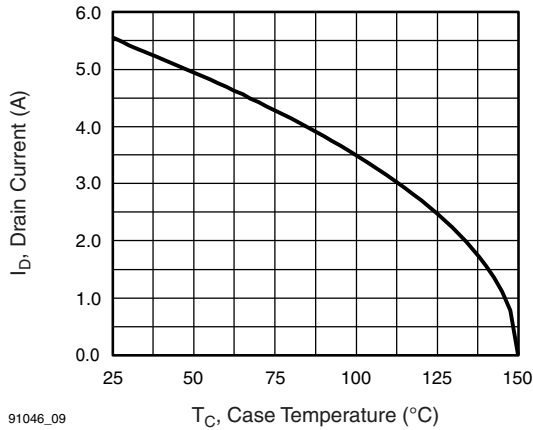


Fig. 9 - Maximum Drain Current vs. Case Temperature

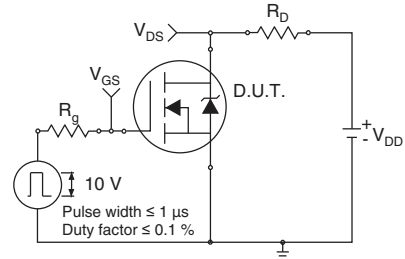


Fig. 10a - Switching Time Test Circuit

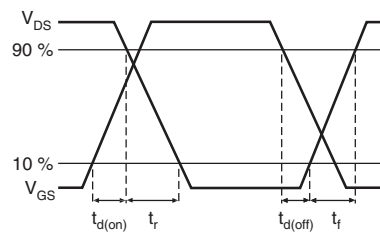


Fig. 10b - Switching Time Waveforms

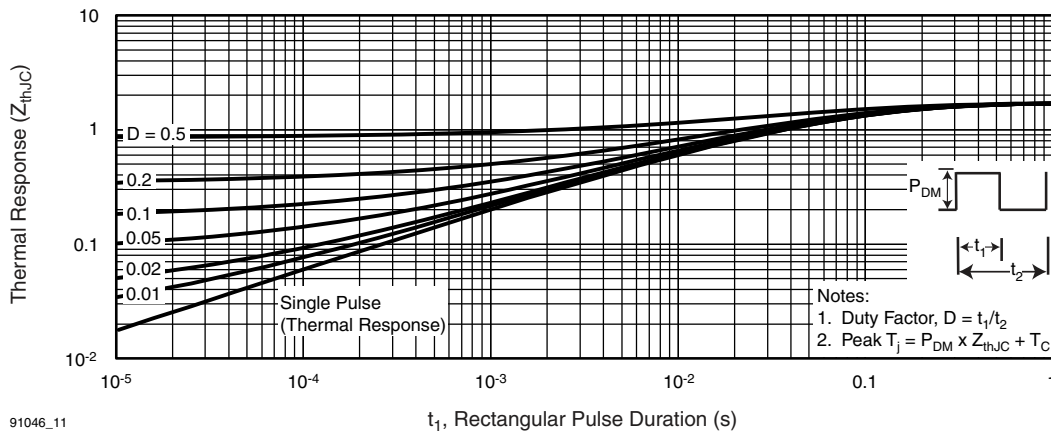


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

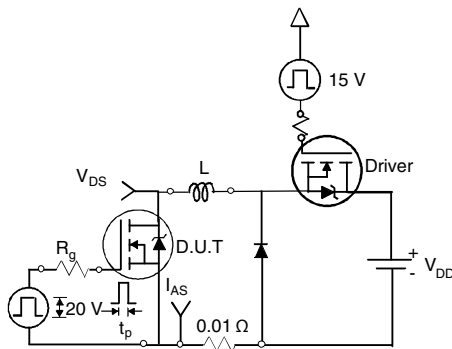


Fig. 12a - Unclamped Inductive Test Circuit

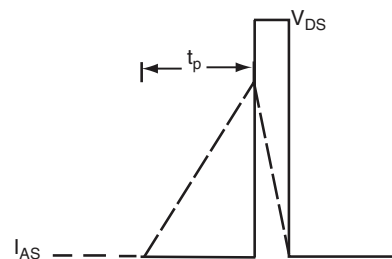


Fig. 12b - Unclamped Inductive Waveforms

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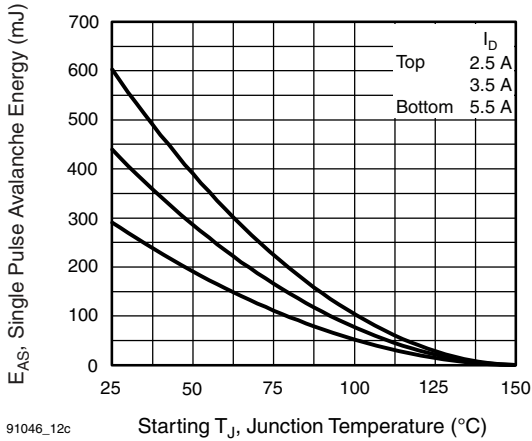


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

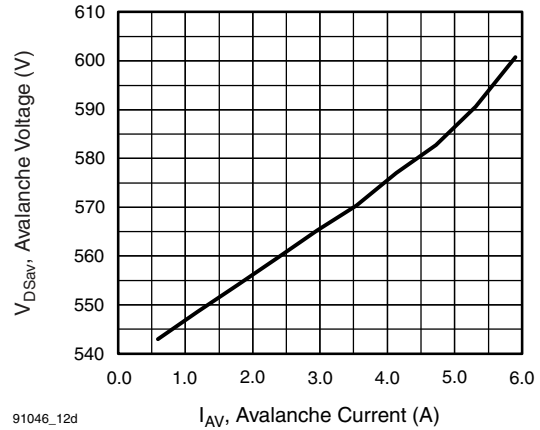


Fig. 12d - Typical Drain-to-Source Voltage vs. Avalanche Current

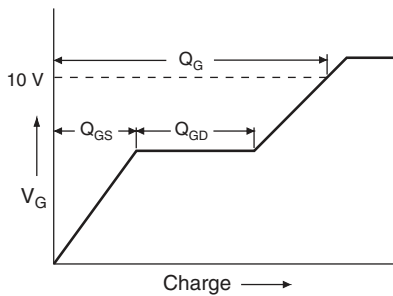


Fig. 13a - Maximum Avalanche Energy vs. Drain Current

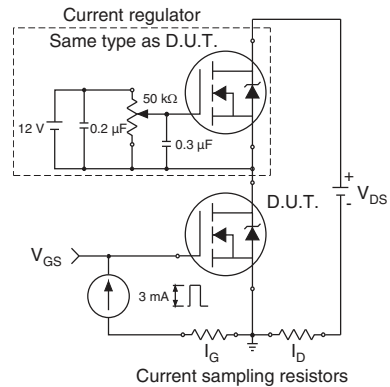


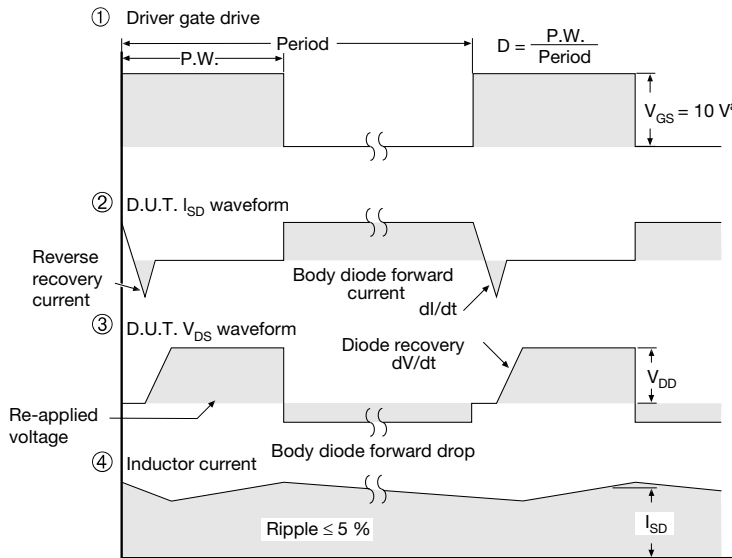
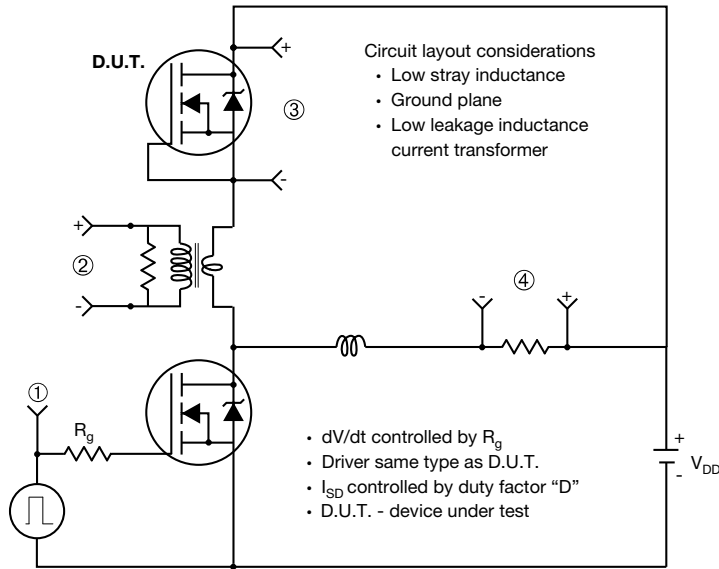
Fig. 13b - Gate Charge Test Circuit



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Peak Diode Recovery dV/dt Test Circuit



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

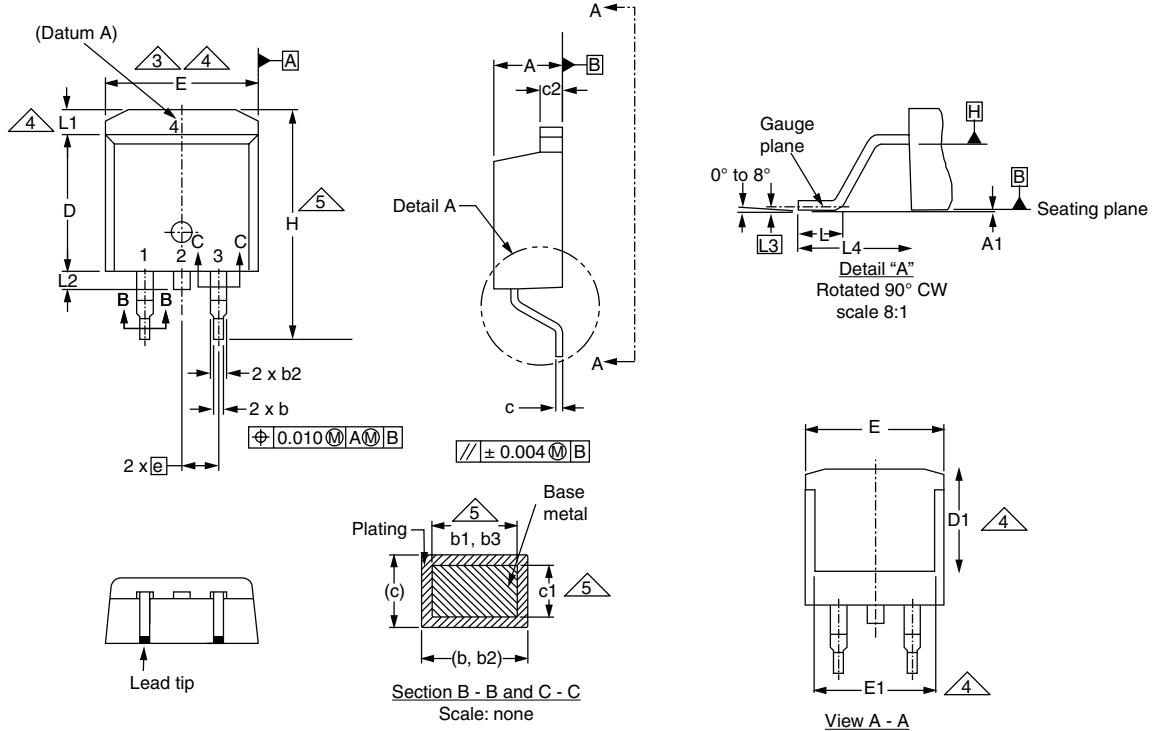
Fig. 14 - For N-Channel

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Package Information
 Vishay Siliconix

TO-263AB (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08
 DWG: 5970

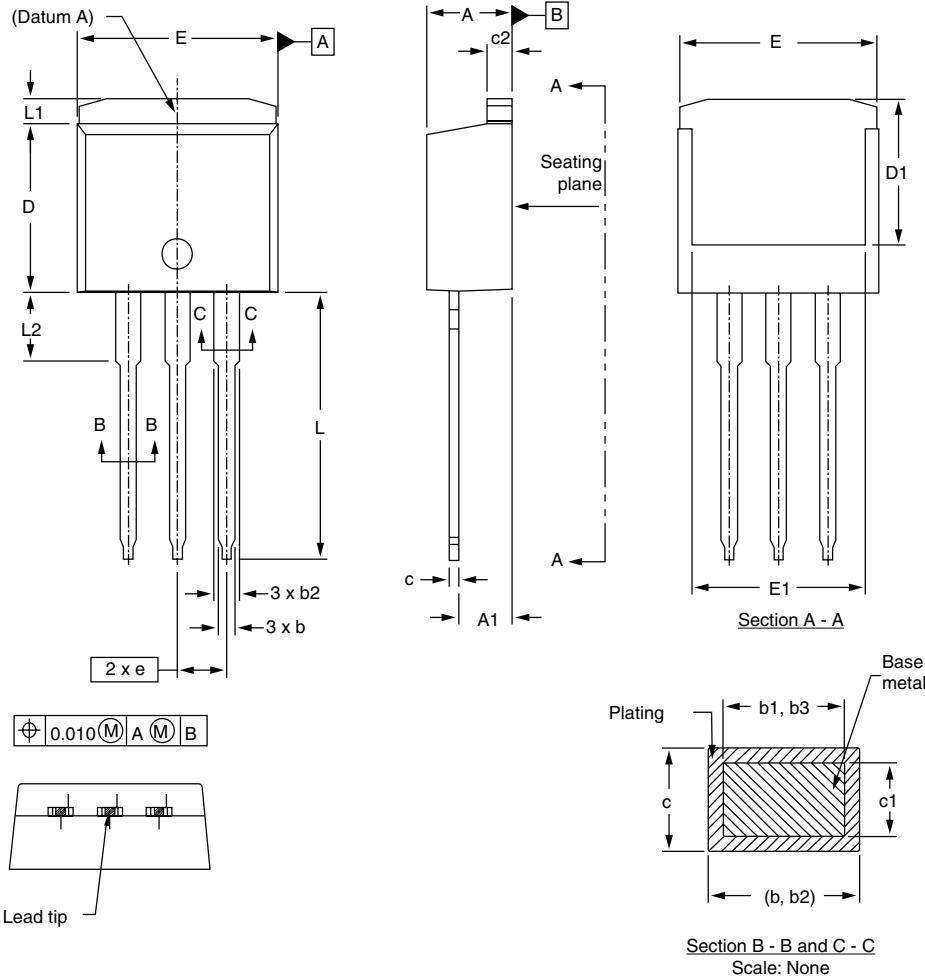
Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.



Package Information
 Vishay Siliconix

I²PAK (TO-262) (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	2.03	3.02	0.080	0.119
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D	8.38	9.65	0.330	0.380
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
L	13.46	14.10	0.530	0.555
L1	-	1.65	-	0.065
L2	3.56	3.71	0.140	0.146

ECN: S-82442-Rev. A, 27-Oct-08
 DWG: 5977

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm per side. These dimensions are measured at the outmost extremes of the plastic body.
3. Thermal pad contour optional within dimension E, L1, D1, and E1.
4. Dimension b1 and c1 apply to base metal only.



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