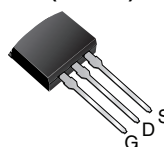
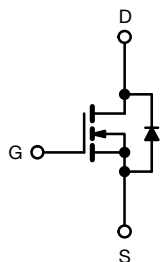
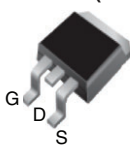


Power MOSFET

I²PAK (TO-262)

D²PAK (TO-263)


N-Channel MOSFET

PRODUCT SUMMARY

V _{DS} (V)	400	
R _{DS(on)} max. (Ω)	V _{GS} = 10 V	1.0
Q _g max. (nC)	22	
Q _{gs} (nC)	5.8	
Q _{gd} (nC)	9.3	
Configuration	Single	

FEATURES

- 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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS*
Available
HALOGEN
FREE
Available

Note

* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details

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	-	-

Note

a. See device orientation.

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °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 °C	A
		T _C = 100 °C	
Pulsed drain current ^{a, e}	I _{DM}	22	
Linear derating factor		0.6	W/°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	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	°C
Soldering recommendations (peak temperature) ^d	for 10 s	300	

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
- Starting T_J = 25 °C, L = 19 mH, R_g = 25 Ω, I_{AS} = 5.5 A (see fig. 12)
- I_{SD} ≤ 5.5 A, dI/dt ≤ 90 A/μs, V_{DD} ≤ V_{DS}, T_J ≤ 150 °C
- 1.6 mm from case
- Uses IRF730A, SiHF730A data and test conditions

**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 ($T_J = 25^\circ\text{C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0, I_D = 250 \mu\text{A}$	400	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	Reference to 25°C , $I_D = 1 \text{ mA}$ ^d	-	0.5	-	V/°C
Gate-source threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	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
		$V_{DS} = 320 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 125^\circ\text{C}$	-	-	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}	$V_{GS} = 0 \text{ V},$ $V_{DS} = 25 \text{ V},$ $f = 1.0 \text{ MHz},$ see fig. 5 ^d	-	600	-	pF
Output Capacitance	C_{oss}		-	103	-	
Reverse Transfer Capacitance	C_{rss}		-	4.0	-	
Output Capacitance	C_{oss}	$V_{GS} = 0 \text{ V}$ $V_{DS} = 1.0 \text{ V}, f = 1.0 \text{ MHz}$ $V_{DS} = 320 \text{ V}, f = 1.0 \text{ MHz}$	-	890	-	
Effective Output Capacitance	$C_{oss \text{ eff.}}$		-	30	-	
Total Gate Charge	Q_g	$V_{GS} = 10 \text{ V}$ $I_D = 3.5 \text{ A}, V_{DS} = 320 \text{ V},$ see fig. 6 and 13 ^{b, d}	-	-	22	nC
Gate-Source Charge	Q_{gs}		-	-	5.8	
Gate-Drain Charge	Q_{gd}		-	-	9.3	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 200 \text{ V}, I_D = 3.5 \text{ A},$ $R_g = 12 \Omega, R_D = 57 \Omega,$ 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	-	
Gate Input Resistance	R_g	$f = 1 \text{ MHz},$ open drain	2.7	-	10.9	Ω
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}	$T_J = 25^\circ\text{C}, I_S = 5.5 \text{ A}, V_{GS} = 0 \text{ V}$ ^b	-	-	1.6	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 3.5 \text{ A}, dI/dt = 100 \text{ A}/\mu\text{s}$ ^{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

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
b. Pulse width $\leq 300 \mu\text{s}$; duty cycle $\leq 2\%$.
c. $C_{oss \text{ eff.}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0 % to 80 % V_{DS} .
d. Uses IRF730A, SiHF730A data and test conditions.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

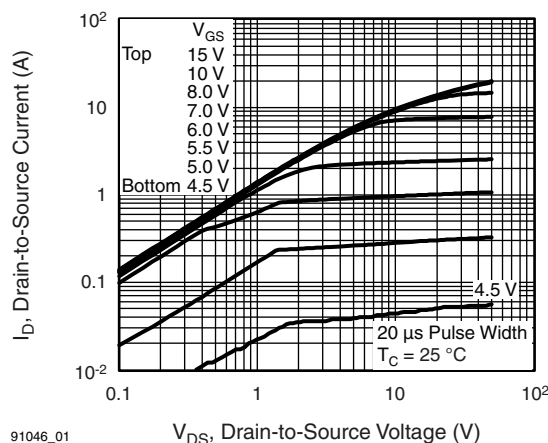


Fig. 1 - Typical Output Characteristics

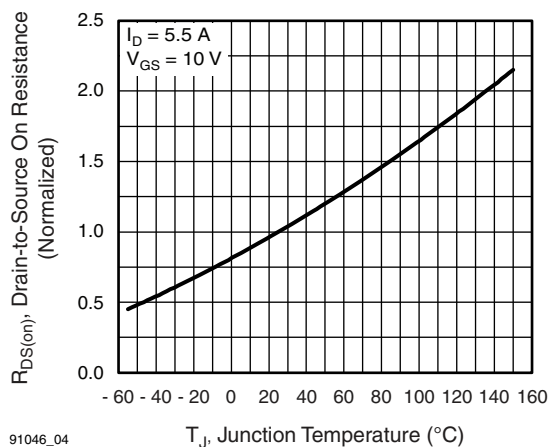


Fig. 4 - Normalized On-Resistance vs. Temperature

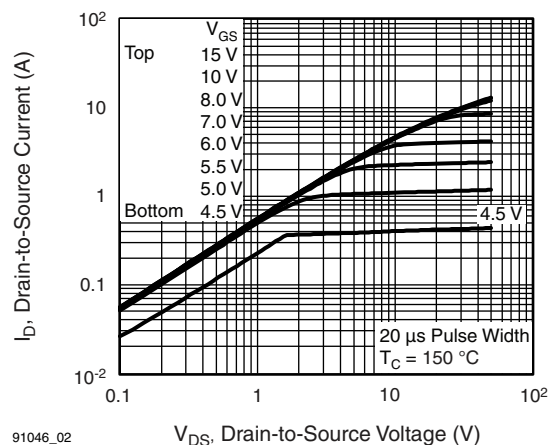


Fig. 2 - Typical Output Characteristics

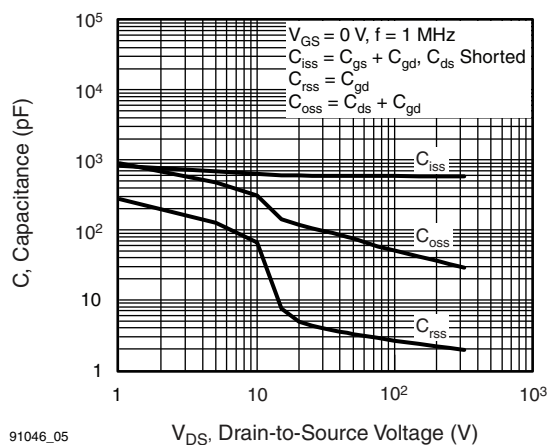


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

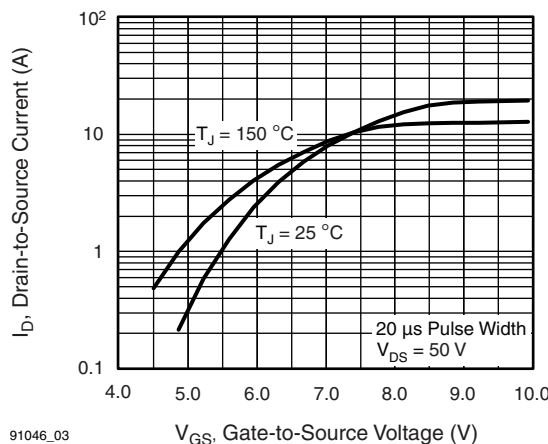


Fig. 3 - Typical Transfer Characteristics

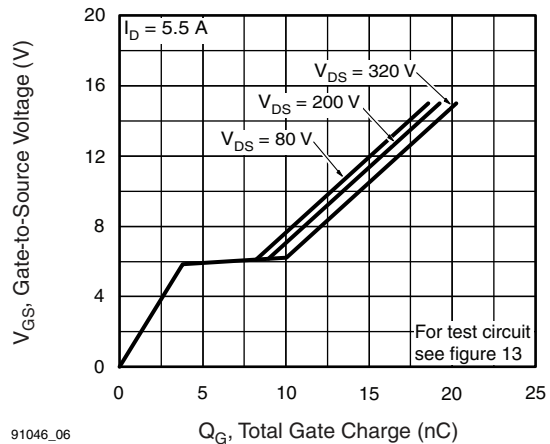


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

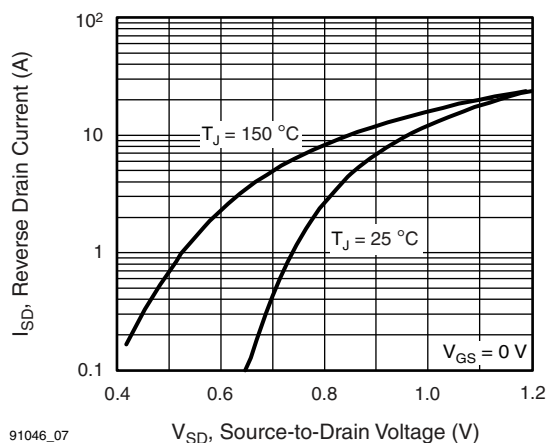
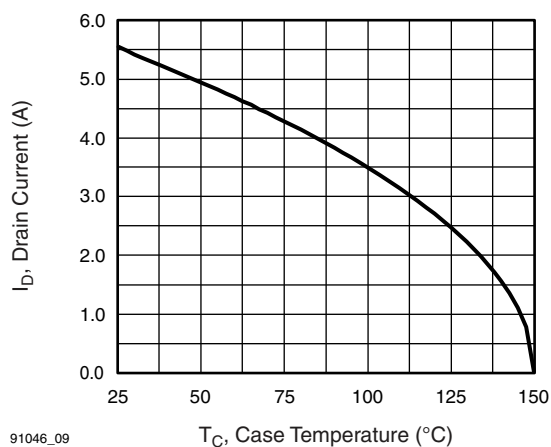
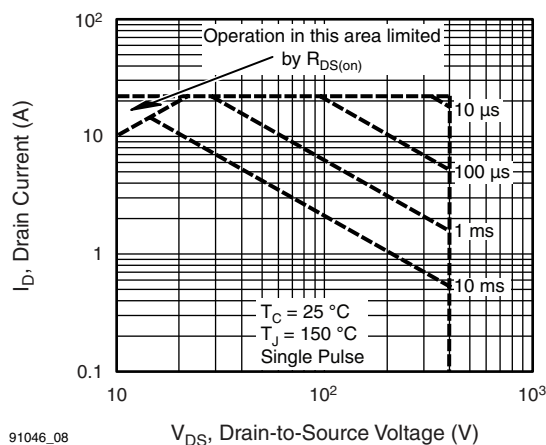
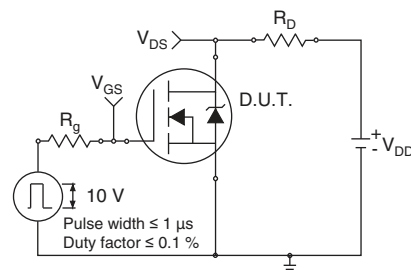
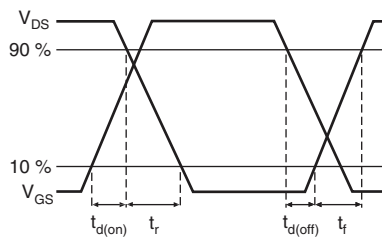
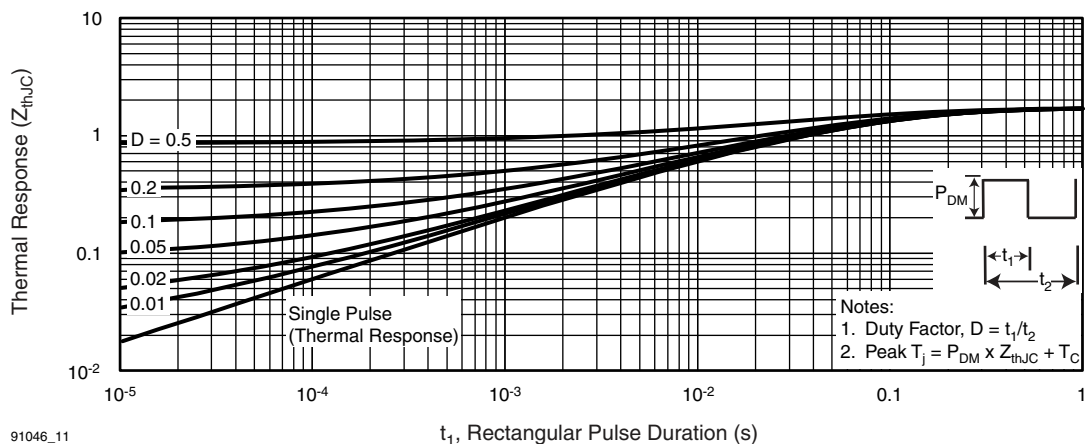

Fig. 7 - Typical Source-Drain Diode Forward Voltage

Fig. 9 - Maximum Drain Current vs. Case Temperature

Fig. 8 - Maximum Safe Operating Area

Fig. 10a - Switching Time Test Circuit

Fig. 10b - Switching Time Waveforms


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

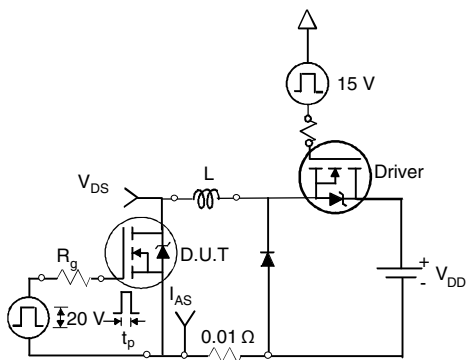


Fig. 12a - Unclamped Inductive Test Circuit

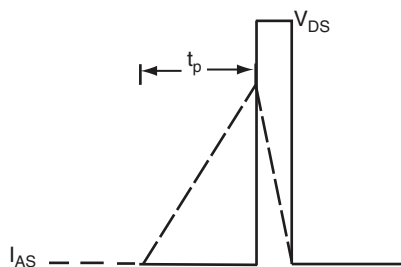


Fig. 12b - Unclamped Inductive Waveforms

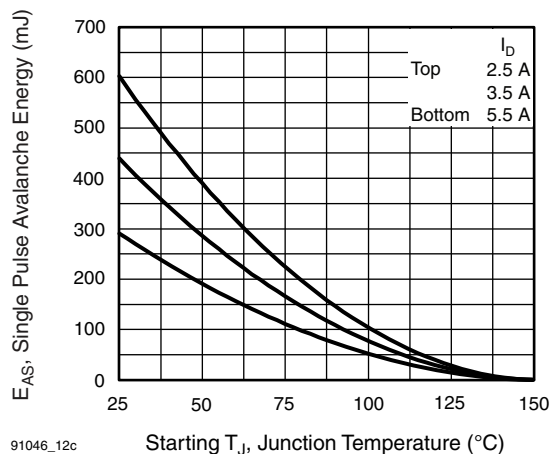


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

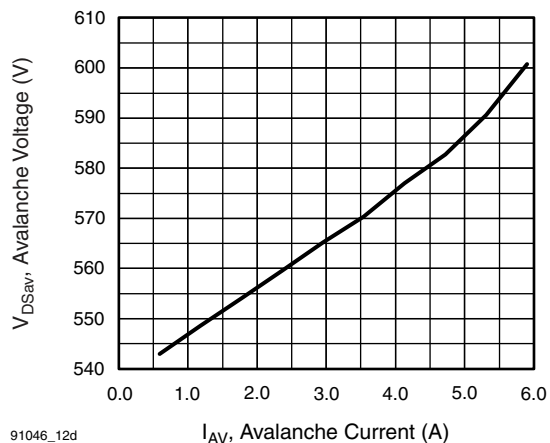


Fig. 12d - Typical Drain-to-Source Voltage vs. Avalanche Current

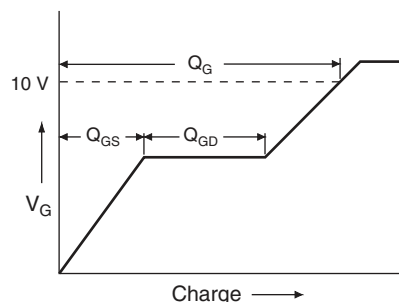


Fig. 13a - Maximum Avalanche Energy vs. Drain Current

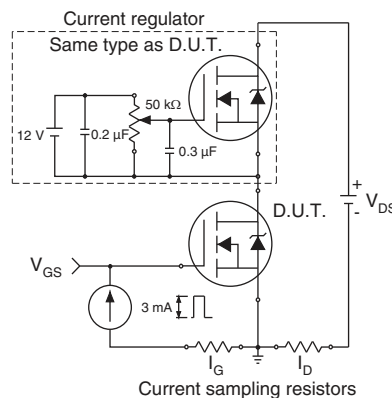
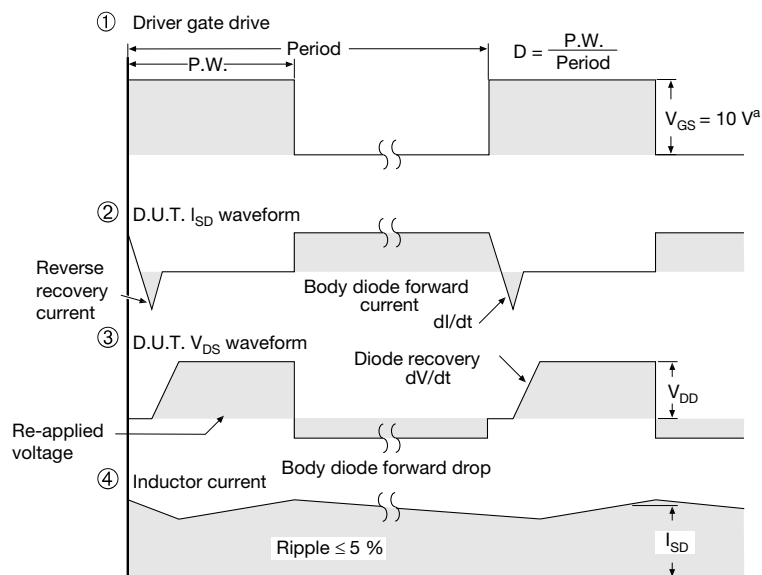
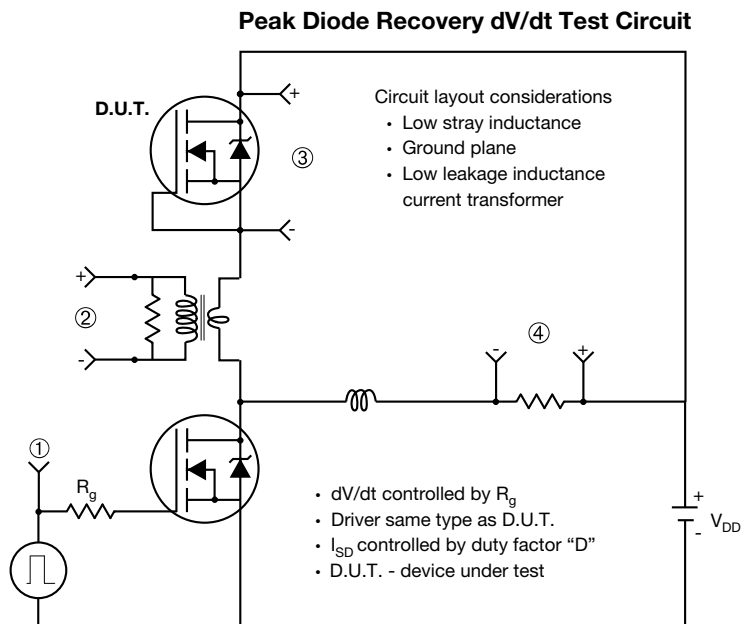


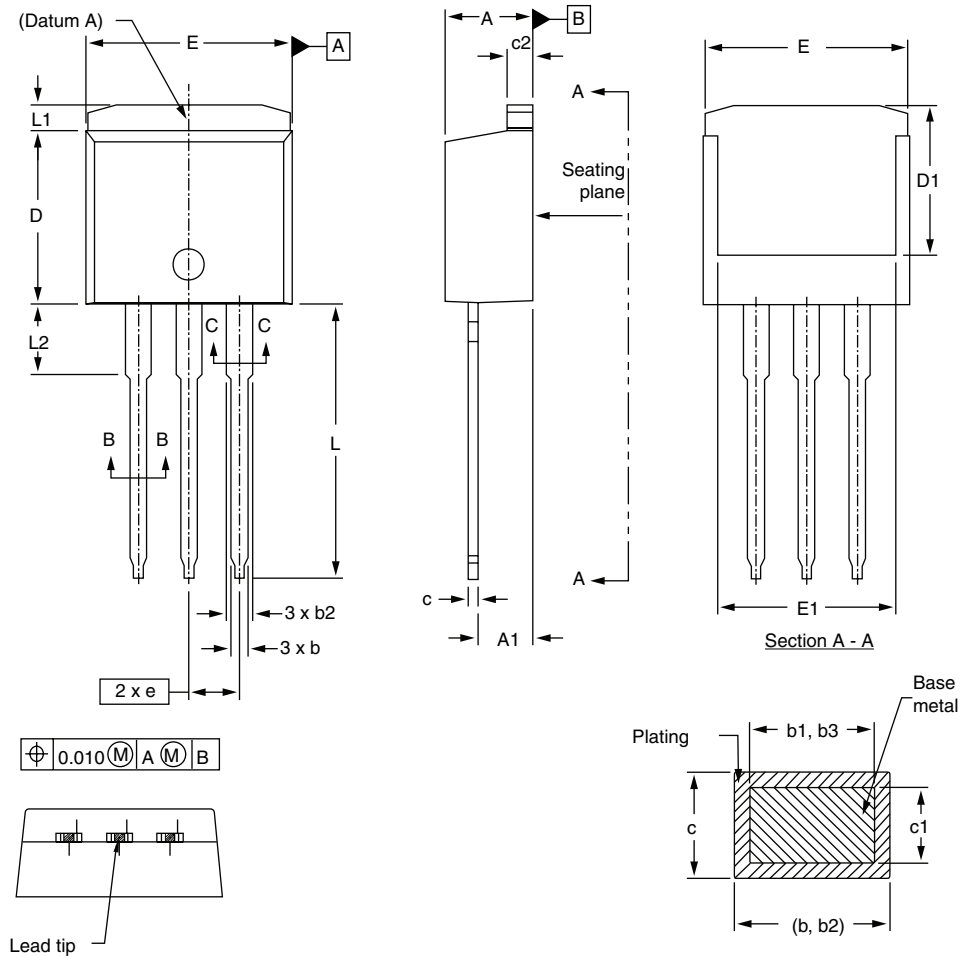
Fig. 13b - Gate Charge Test Circuit


Fig. 14 - For N-Channel

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	MILLIMETERS		INCHES	
DIM.	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

I²PAK (TO-262) (HIGH VOLTAGE)



	MILLIMETERS		INCHES	
DIM.	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

	MILLIMETERS		INCHES	
DIM.	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.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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