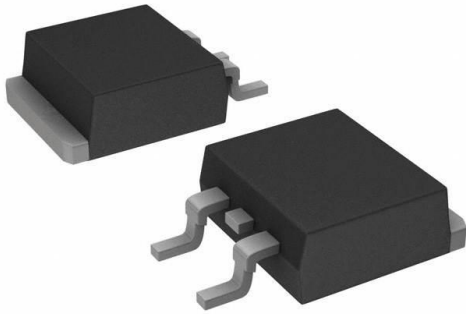


IRF840ASPBF Datasheet

www.digi-electronics.com



DiGi Electronics Part Number	IRF840ASPBF-DG
Manufacturer	Vishay Siliconix
Manufacturer Product Number	IRF840ASPBF
Description	MOSFET N-CH 500V 8A D2PAK
Detailed Description	N-Channel 500 V 8A (Tc) 3.1W (Ta), 125W (Tc) Surface Mount TO-263 (D2PAK)

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Purchase and inquiry

Manufacturer Product Number:

IRF840ASPBF

Series:

-

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

500 V

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

10V

Vgs(th) (Max) @ Id:

4V @ 250µA

Vgs (Max):

±30V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

TO-263 (D2PAK)

Base Product Number:

IRF840

Manufacturer:

Vishay Siliconix

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

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

8A (Tc)

Rds On (Max) @ Id, Vgs:

850mOhm @ 4.8A, 10V

Gate Charge (Qg) (Max) @ Vgs:

38 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

1018 pF @ 25 V

Power Dissipation (Max):

3.1W (Ta), 125W (Tc)

Mounting Type:

Surface Mount

Package / Case:

TO-263-3, D2PAK (2 Leads + Tab), TO-263AB

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Affected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

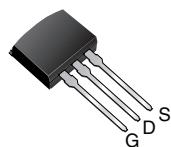
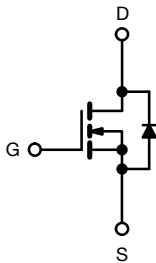
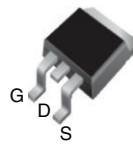


www.vishay.com

IRF840AS, SiHF840AS, IRF840AL, SiHF840AL

Vishay Siliconix

Power MOSFET

I²PAK (TO-262)D²PAK (TO-263)

N-Channel MOSFET

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

PRODUCT SUMMARY	
V_{DS} (V)	500
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$ 0.85
Q_g max. (nC)	38
Q_{gs} (nC)	9.0
Q_{gd} (nC)	18
Configuration	Single

APPLICATIONS

- Switch mode power supply (SMPS)
- Uninterruptible power supply
- High speed power switching

TYPICAL SMPS TOPOLOGIES

- Two transistor forward
- Half bridge
- Full bridge

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	SiHF840AS-GE3	SiHF840ASTRL-GE3 ^a	SiHF840ASTRR-GE3 ^a	SiHF840AL-GE3 ^a
Lead (Pb)-free	IRF840ASPbF	IRF840ASTRLPbF ^a	IRF840ASTRRPbF ^a	IRF840ALPbF

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}	500	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current	V_{GS} at 10 V	$T_C = 25\text{ }^\circ\text{C}$	A
		$T_C = 100\text{ }^\circ\text{C}$	
Pulsed Drain Current ^a	I_{DM}	32	
Linear Derating Factor		1.0	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ^b	E_{AS}	510	mJ
Repetitive Avalanche Current ^a	I_{AR}	8.0	A
Repetitive Avalanche Energy ^a	E_{AR}	13	mJ
Maximum Power Dissipation	P_D	$T_C = 25\text{ }^\circ\text{C}$	125
		$T_A = 25\text{ }^\circ\text{C}$	3.1
Peak Diode Recovery dV/dt ^{c, e}	dV/dt	5.0	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$
Soldering Temperature ^d	for 10 s	300	

Notes


- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
- Starting $T_J = 25\text{ }^\circ\text{C}$, $L = 16\text{ mH}$, $R_g = 25\text{ }^\circ\Omega$, $I_{AS} = 8.0\text{ A}$ (see fig. 12)
- $I_{SD} \leq 8.0\text{ A}$, $dI/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$
- 1.6 mm from case
- Uses IRF840A, SiH840A data and test conditions



THERMAL RESISTANCE RATINGS					
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient (PCB mount) ^a	R_{thJA}	-	-	40	°C/W
Maximum Junction-to-Case (Drain)	R_{thJC}	-	-	1.0	

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}	$V_{GS} = 0, I_D = 250\text{ }\mu\text{A}$		500	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}^d$		-	0.58	-	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}	$V_{GS} = \pm 30\text{ V}$		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 500\text{ V}, V_{GS} = 0\text{ V}$		-	-	25	μA
		$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$		-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 4.8\text{ A}^b$	-	-	0.85	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}, I_D = 4.8\text{ A}$		3.7	-	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V},$ $V_{DS} = 25\text{ V},$ $f = 1.0\text{ MHz},$ see fig. 5		-	1018	-	μF
Output Capacitance	C_{oss}			-	155	-	
Reverse Transfer Capacitance	C_{rss}			-	8.0	-	
Output Capacitance	C_{oss}	$V_{GS} = 0\text{ V}$	$V_{DS} = 1.0\text{ V}, f = 1.0\text{ MHz}$	-	1490	-	μF
Output Capacitance	C_{oss}		$V_{DS} = 400\text{ V}, f = 1.0\text{ MHz}$	-	42	-	
Effective Output Capacitance	$C_{oss\text{ eff.}}$	$V_{DS} = 0\text{ V to } 480\text{ V}^{c, d}$		-	56	-	μF
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$I_D = 8.0\text{ A}, V_{DS} = 400\text{ V},$ see fig. 6 and 13 ^{b, d}	-	-	38	nC
Gate-Source Charge	Q_{gs}			-	-	9.0	
Gate-Drain Charge	Q_{gd}			-	-	18	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 250\text{ V}, I_D = 8.0\text{ A},$ $R_g = 9.1\text{ }\Omega, R_D = 31\text{ }\Omega,$ see fig. 10 ^{b, d}		-	11	-	ns
Rise Time	t_r			-	23	-	
Turn-Off Delay Time	$t_{d(off)}$			-	26	-	
Fall Time	t_f			-	19	-	
Gate Input Resistance	R_g	$f = 1\text{ MHz},$ open drain		0.7	-	3.7	Ω
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	8.0	A
Pulsed Diode Forward Current ^a	I_{SM}			-	-	32	
Body Diode Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}, I_S = 8.0\text{ A}, V_{GS} = 0\text{ V}^b$		-	-	2.0	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}, I_F = 8.0\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}^b$		-	422	633	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	2.0	3.0	μC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S and L_D)					

Notes

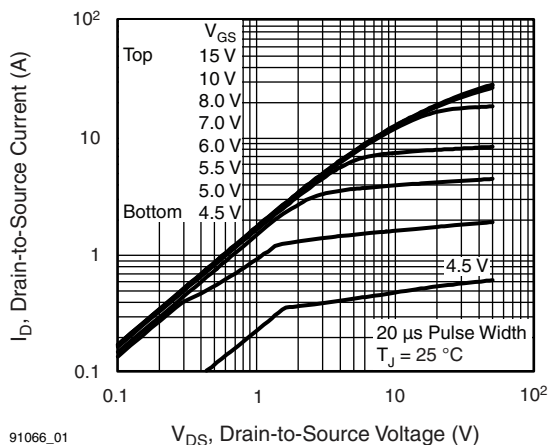
- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
- Pulse width $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\%$
- $C_{oss\text{ eff.}}$ is a fixed capacitance that gives the same charging time as C_{oss} while V_{DS} is rising from 0% to 80% V_{DS}
- Uses IRF840A, SiHF840A data and test conditions



IRF840AS, SiHF840AS, IRF840AL, SiHF840AL

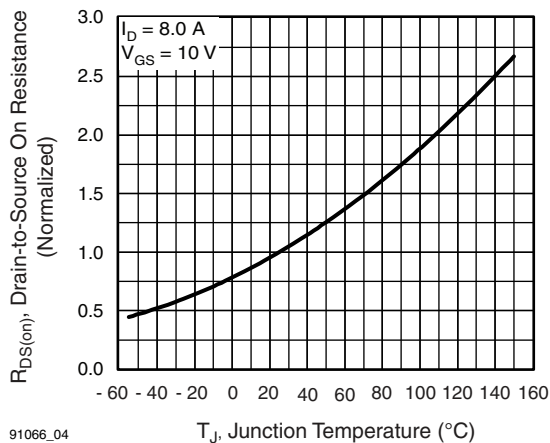
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



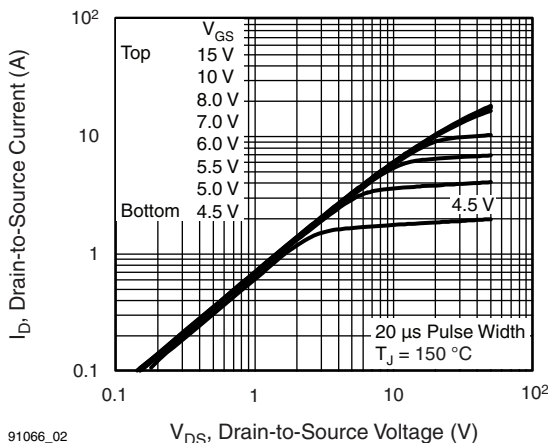
91066_01

Fig. 1 - Typical Output Characteristics



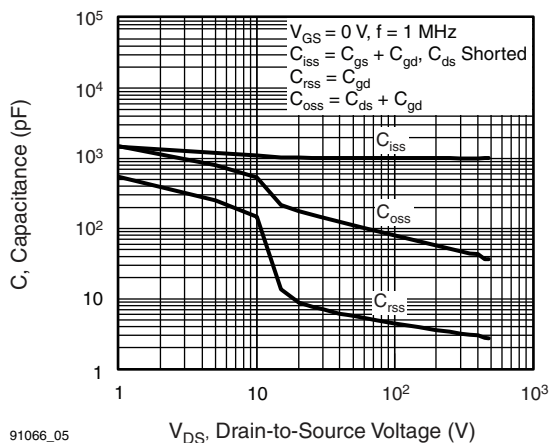
91066_04

Fig. 4 - Normalized On-Resistance vs. Temperature



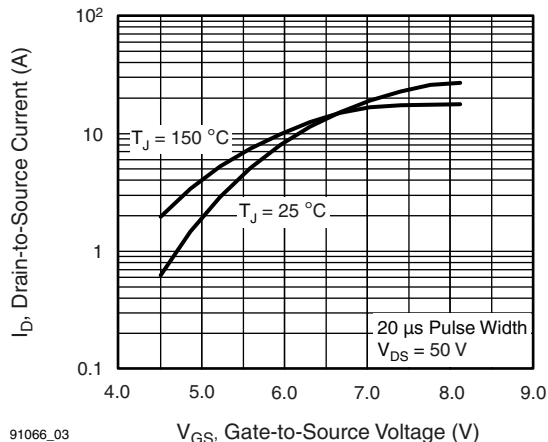
91066_02

Fig. 2 - Typical Output Characteristics



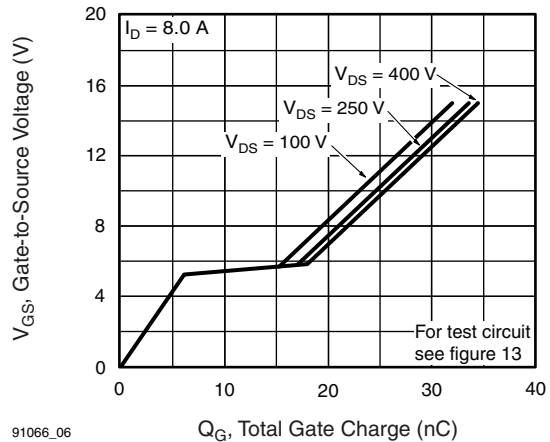
91066_05

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



91066_03

Fig. 3 - Typical Transfer Characteristics



91066_06

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



IRF840AS, SiHF840AS, IRF840AL, SiHF840AL

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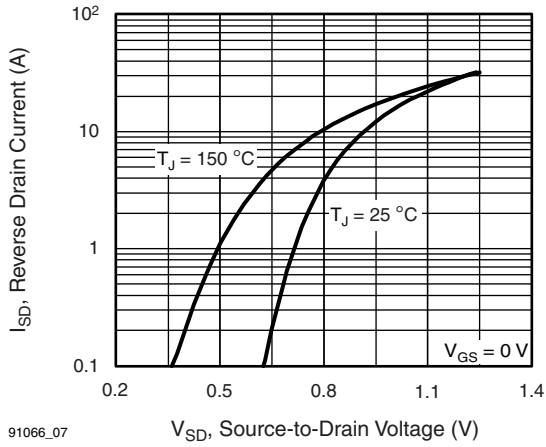


Fig. 7 - Typical Source-Drain Diode Forward Voltage

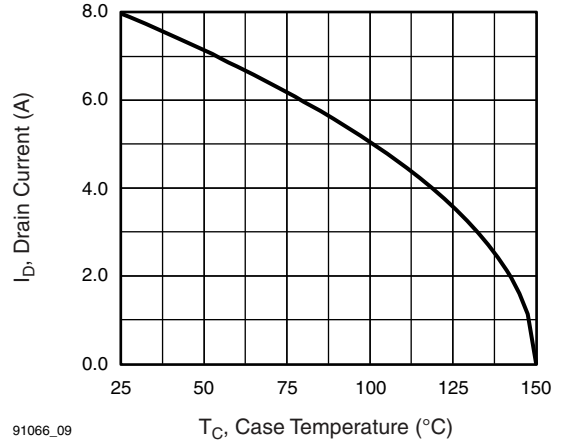


Fig. 9 - Maximum Drain Current vs. Case Temperature

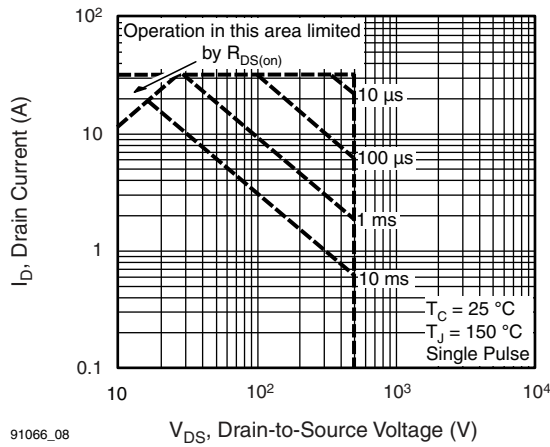


Fig. 8 - Maximum Safe Operating Area

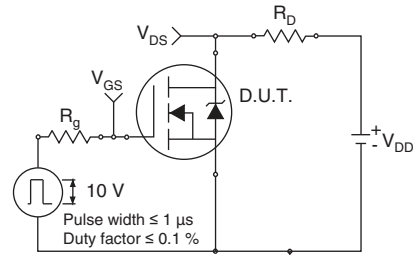


Fig. 10a - Switching Time Test Circuit

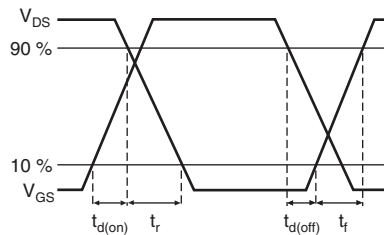


Fig. 10b - Switching Time Waveforms

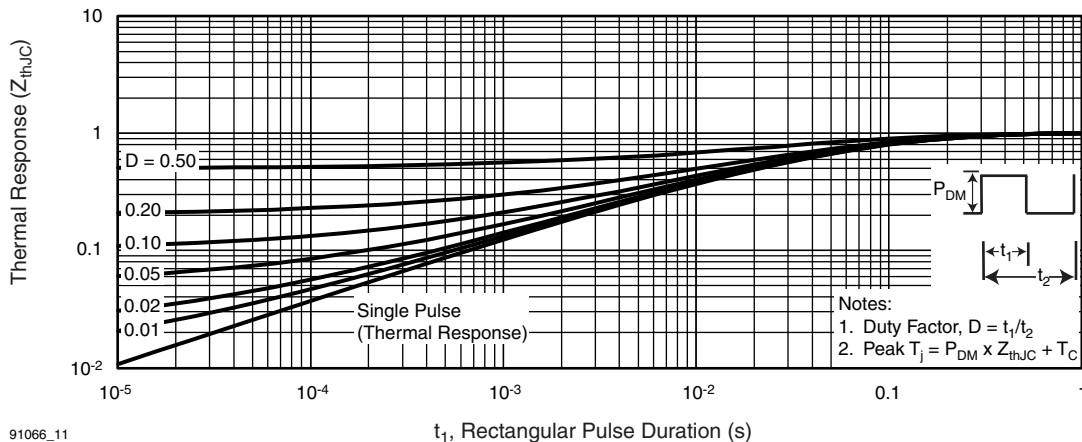


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case



IRF840AS, SiHF840AS, IRF840AL, SiHF840AL

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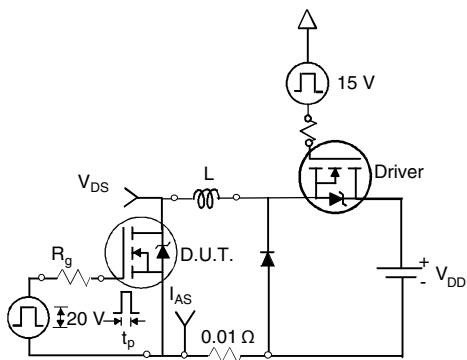


Fig. 12a - Unclamped Inductive Test Circuit

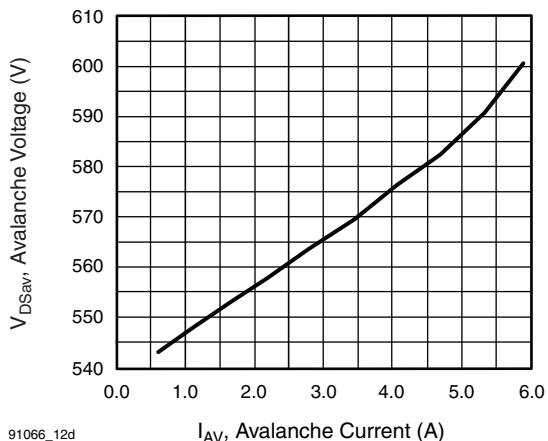


Fig. 12d - Typical Drain-to-Source Voltage vs. Avalanche Current

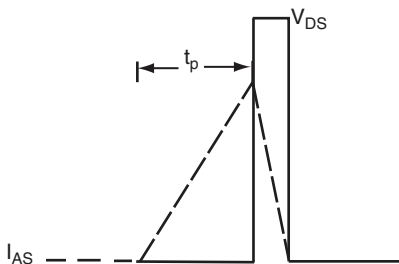


Fig. 12b - Unclamped Inductive Waveforms

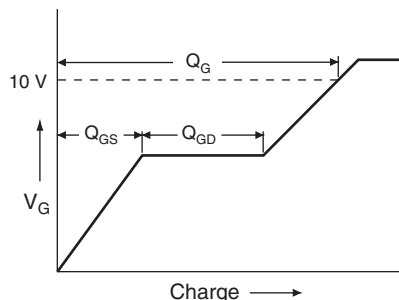


Fig. 13a - Basic Gate Charge Waveform

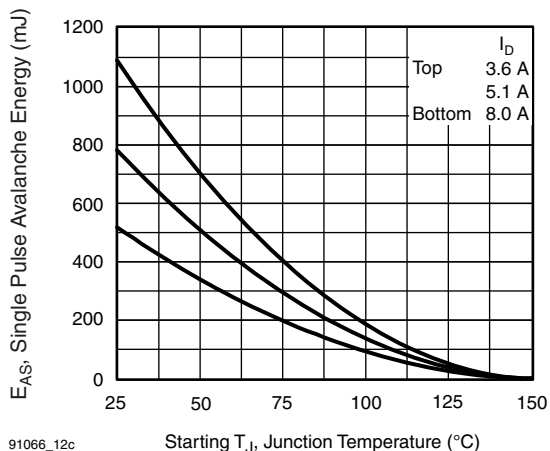


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

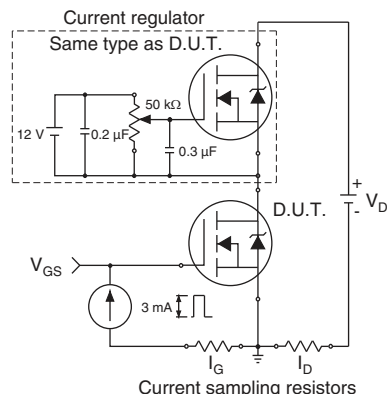
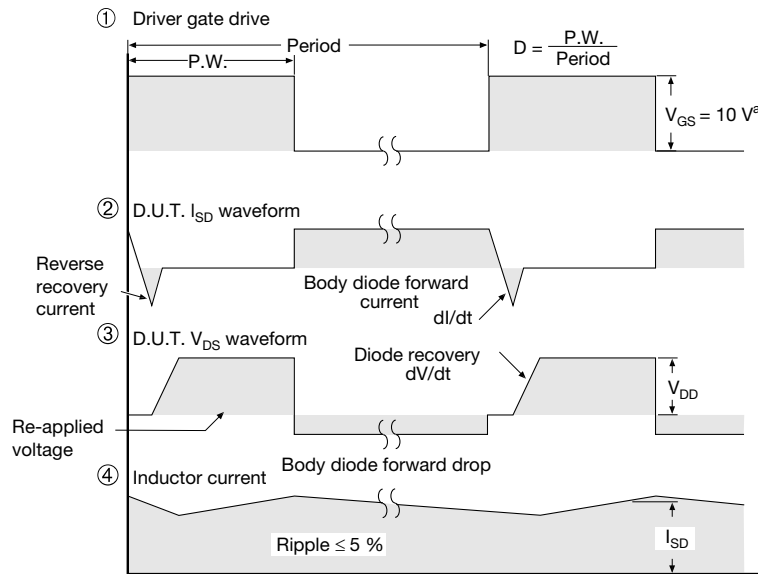
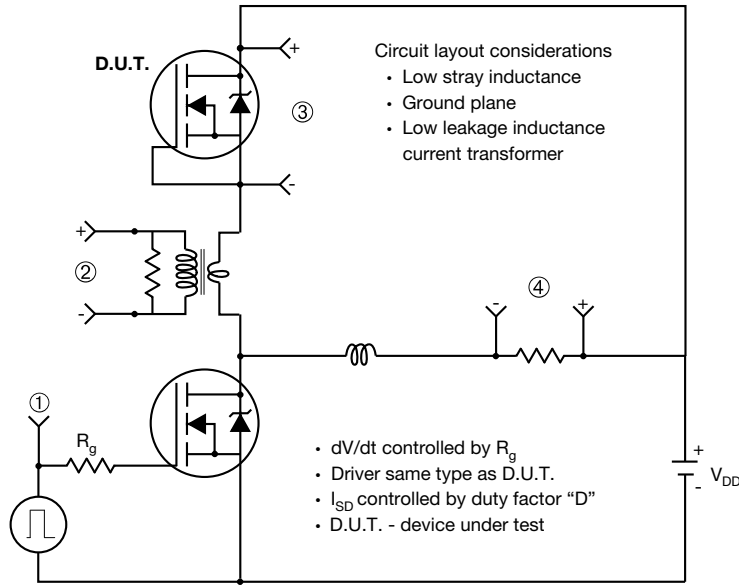


Fig. 13b - Gate Charge Test Circuit



IRF840AS, SiHF840AS, IRF840AL, SiHF840AL

Peak Diode Recovery dV/dt Test Circuit



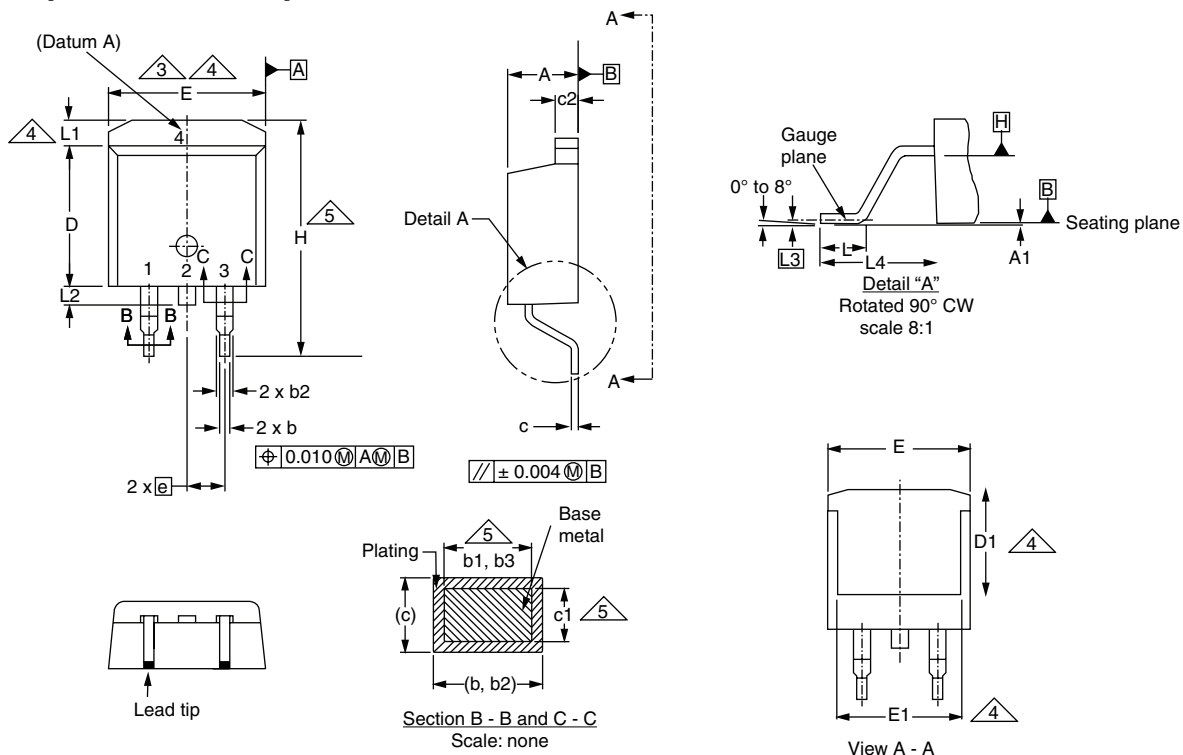
Note
a. $V_{GS} = 5\text{ V}$ for logic level devices

Fig. 14 - For N-Channel

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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

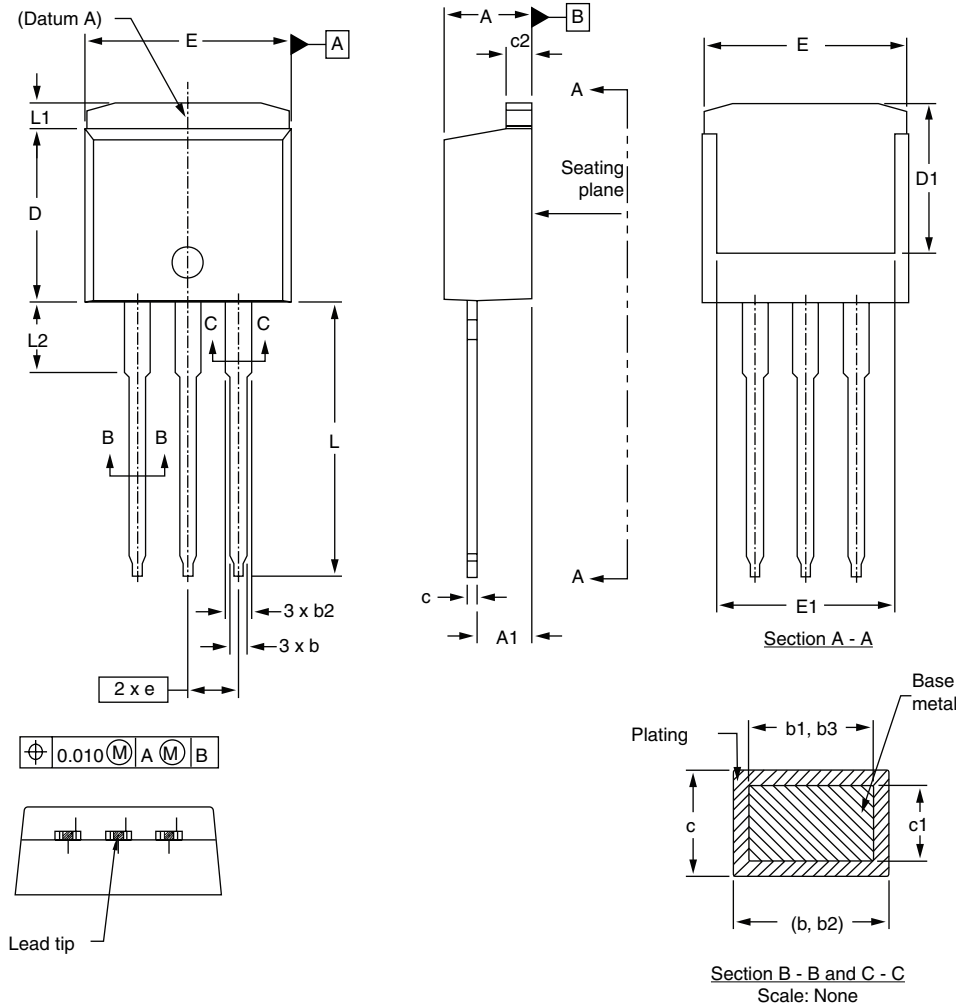
ECN: S-82110-Rev. A, 15-Sep-08
 DWG: 5970

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.



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

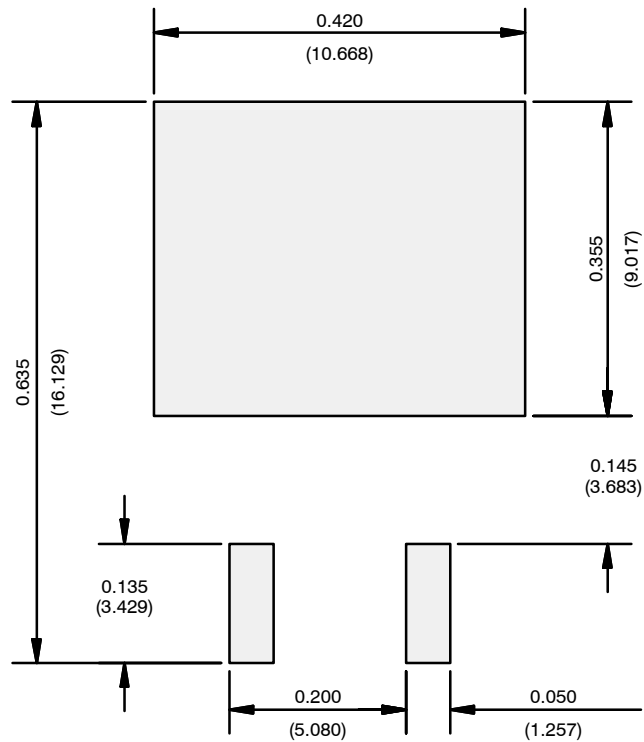
ECN: S-82442-Rev. A, 27-Oct-08
 DWG: 5977

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.



RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

[Return to Index](#)



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