

IRF840LCSTRL Datasheet

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DiGi Electronics Part Number	IRF840LCSTRL-DG
Manufacturer	Vishay Siliconix
Manufacturer Product Number	IRF840LCSTRL
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:

IRF840LCSTRL

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:

39 nC @ 10 V

Input Capacitance (Ciss) (Max) @ Vds:

1100 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:

RoHS non-compliant

ECCN:

EAR99

Moisture Sensitivity Level (MSL):

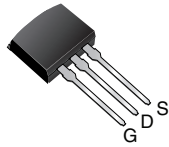
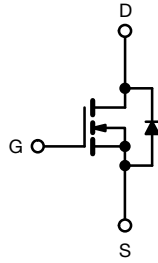
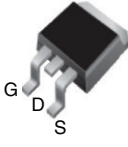
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HTSUS:

8541.29.0095



Power MOSFET

I²PAK (TO-262)D²PAK (TO-263)

N-Channel MOSFET

FEATURES

- Ultra low gate charge
- Reduced gate drive requirement
- Enhanced 30 V V_{GS} rating
- Reduced C_{iss} , C_{oss} , C_{rss}
- Extremely high frequency operation
- Repetitive avalanche rated
- 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

DESCRIPTION

This series of low charge power MOSFETs achieve significantly lower gate charge than conventional Power MOSFETs. Utilizing the new LCDMOS (low charge device Power MOSFETs) technology, the device improvements are achieved without added product cost, allowing for reduced gate drive requirements and total system savings. In addition, reduced switching losses and improved efficiency are achievable in a variety of high frequency applications. Frequencies of a few MHz at high current are possible using the new low charge Power MOSFETs.

These device improvements combined with the proven ruggedness and reliability that characterize Power MOSFETs offer the designer a new power transistor standard for switching applications.

PRODUCT SUMMARY

V_{DS} (V)	500	
$R_{DS(on)}$ (Ω)	$V_{GS} = 10$ V	0.85
Q_g max. (nC)	39	
Q_{gs} (nC)	10	
Q_{gd} (nC)	19	
Configuration	Single	

ORDERING INFORMATION

Package	D ² PAK (TO-263)	I ² PAK (TO-262)
Lead (Pb)-free and Halogen-free	SiHF840LCS-GE3	SiHF840LCL-GE3
Lead (Pb)-free	IRF840LCSPbF	IRF840LCLPbF
	IRF840LCSTRPbF	-

Note

a. See device orientation.

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °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	$T_C = 25$ °C	8.0
		$T_C = 100$ °C	
Pulsed Drain Current ^{a, e}	I_{DM}	28	A
Linear Derating Factor		1.0	W/°C
Single Pulse Avalanche Energy ^{b, e}	E_{AS}	510	mJ
Avalanche Current ^a	I_{AR}	8.0	A
Repetitive Avalanche Energy ^a	E_{AR}	13	mJ
Maximum Power Dissipation	P_D	$T_C = 25$ °C	125
		$T_A = 25$ °C	3.1
Peak Diode Recovery dV/dt ^{c, e}	dV/dt	3.5	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, $L = 14$ mH, $R_G = 25$ Ω , $I_{AS} = 8.0$ A (see fig. 12)
- $I_{SD} \leq 8.0$ A, $dI/dt \leq 100$ A/ μ s, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °C
- 1.6 mm from case
- Uses IRF840LC, SiHF840LC 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}	-	1.0	

Note

a. When mounted on 1" square PCB (FR-4 or G-10 material)

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, I _D = 250 μA	500	-	-	V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	Reference to 25 °C, I _D = 1 mA ^c	-	0.63	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2.0	-	4.0	V
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 500 V, V _{GS} = 0 V	-	-	25	μA
		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 = 4.8 A ^b	-	-	0.85	Ω
Forward Transconductance	g _{fs}	V _{DS} = 50 V, I _D = 4.8 A ^b	4.0	-	-	S
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1.0 MHz, see fig. 5 ^c	-	1100	-	pF
Output Capacitance	C _{oss}		-	170	-	
Reverse Transfer Capacitance	C _{rss}		-	18	-	
Total Gate Charge	Q _g	V _{GS} = 10 V, I _D = 8.0 A, V _{DS} = 400 V, see fig. 6 and 13 ^{b, c}	-	-	39	nC
Gate-Source Charge	Q _{gs}		-	-	10	
Gate-Drain Charge	Q _{gd}		-	-	19	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 250 V, I _D = 8.0 A, R _g = 9.1 Ω, R _D = 30 Ω, see fig. 10 ^{b, c}	-	12	-	ns
Rise Time	t _r		-	25	-	
Turn-Off Delay Time	t _{d(off)}		-	27	-	
Fall Time	t _f		-	19	-	
Gate Input Resistance	R _g	f = 1 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}		-	-	28	
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 8.0 A, V _{GS} = 0 V ^b	-	-	2.0	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 8.0 A, di/dt = 100 A/μs ^{b, c}	-	490	740	ns
Body Diode Reverse Recovery Charge	Q _{rr}		-	3.0	4.5	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 ≤ 300 μs; duty cycle ≤ 2 %
 c. Uses SiHF840LC data and test conditions

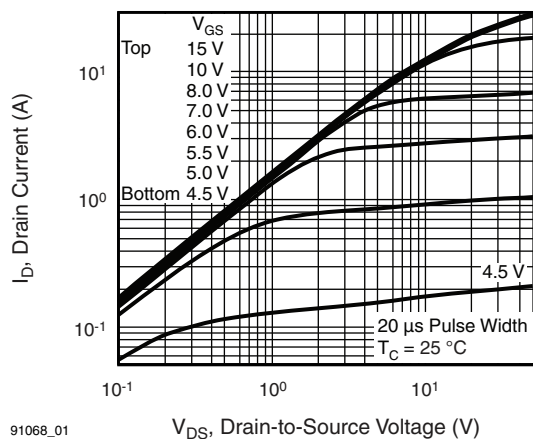


IRF840LCS, IRF840LCL, SiHF840LCS, SiHF840LCL

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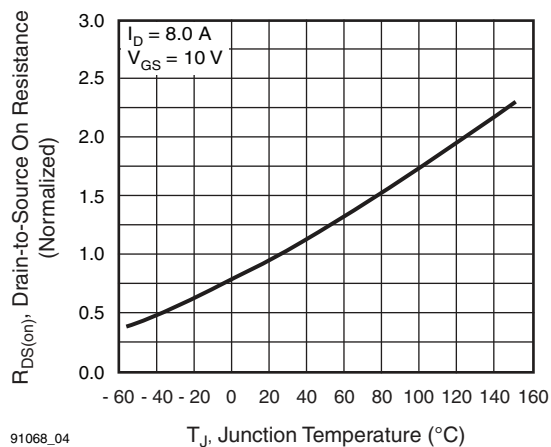
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



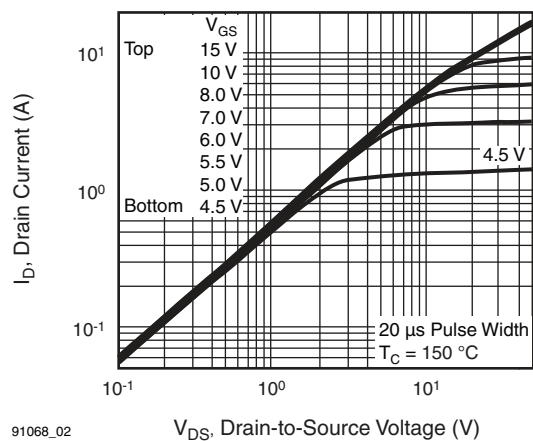
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Fig. 1 - Typical Output Characteristics



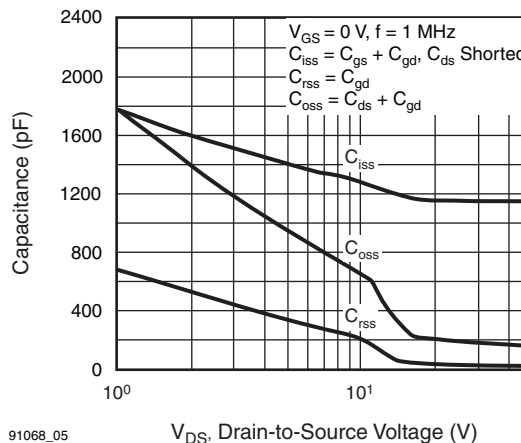
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Fig. 4 - Normalized On-Resistance vs. Temperature



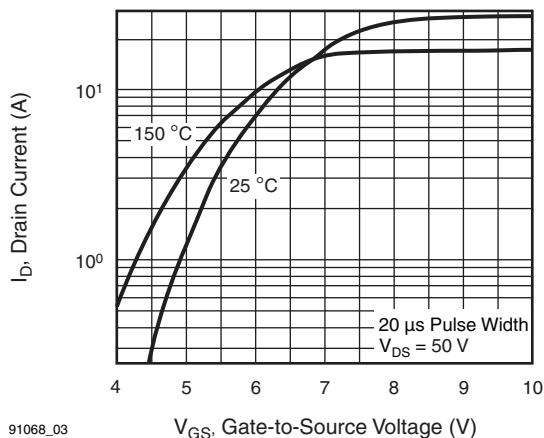
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Fig. 2 - Typical Output Characteristics



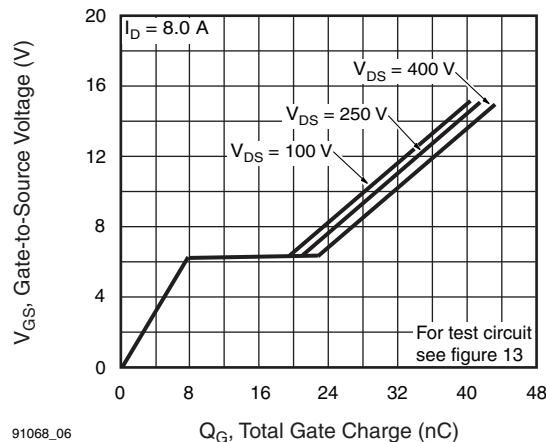
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Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage



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Fig. 3 - Typical Transfer Characteristics



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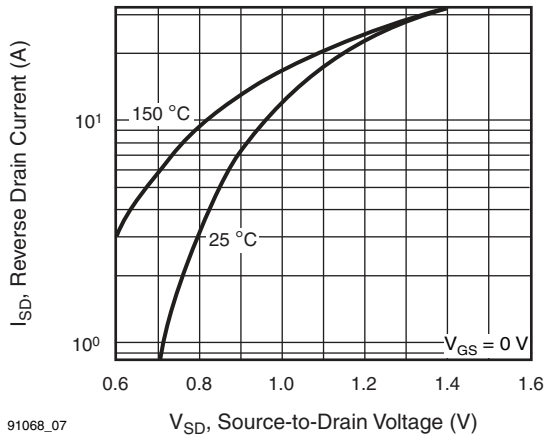
Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



IRF840LCS, IRF840LCL, SiHF840LCS, SiHF840LCL

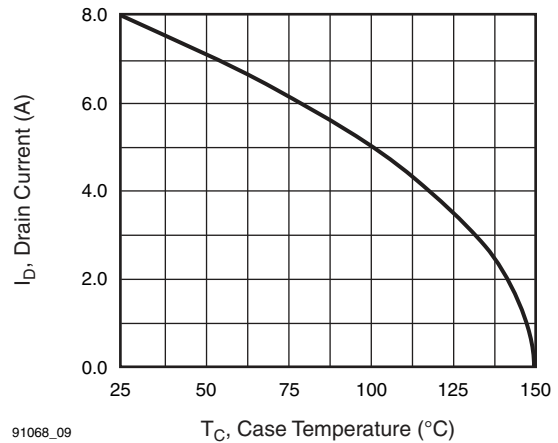
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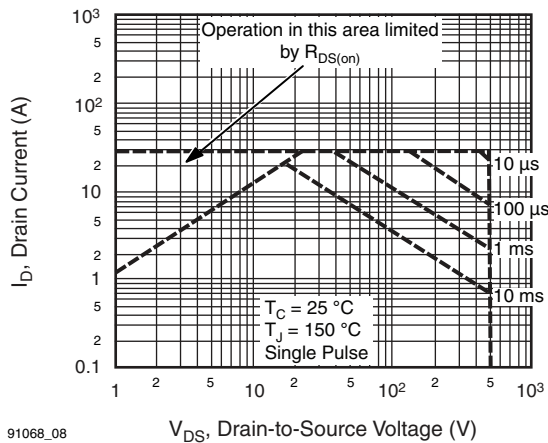
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Fig. 7 - Typical Source-Drain Diode Forward Voltage



91068_09

Fig. 9 - Maximum Drain Current vs. Case Temperature



91068_08

Fig. 8 - Maximum Safe Operating Area

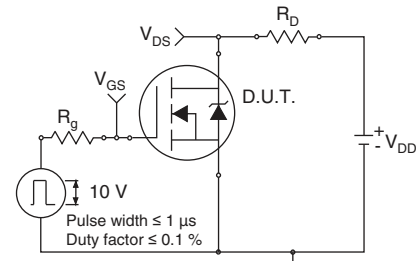


Fig. 10a - Switching Time Test Circuit

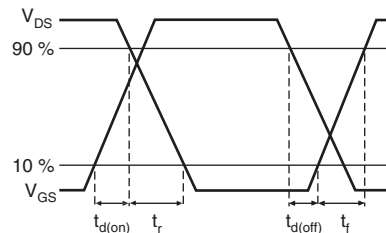
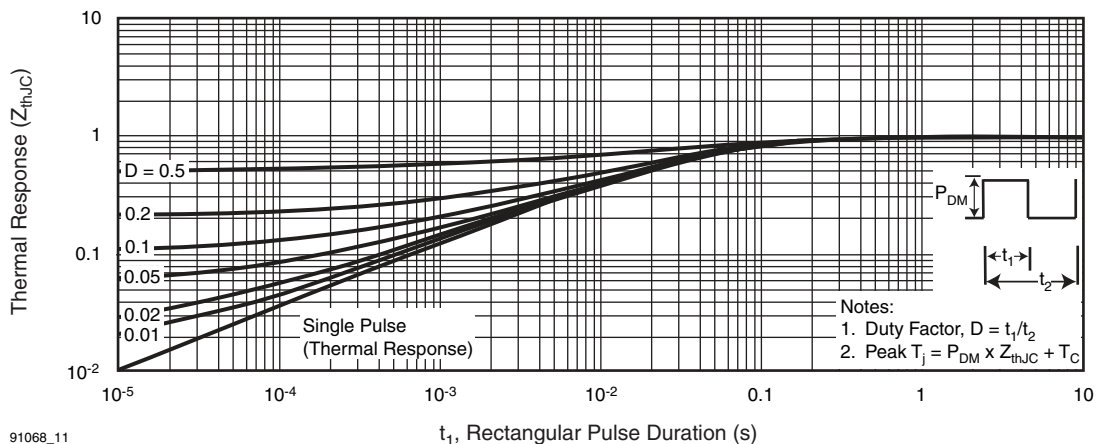


Fig. 10b - Switching Time Waveforms



91068_11

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



IRF840LCS, IRF840LCL, SiHF840LCS, SiHF840LCL

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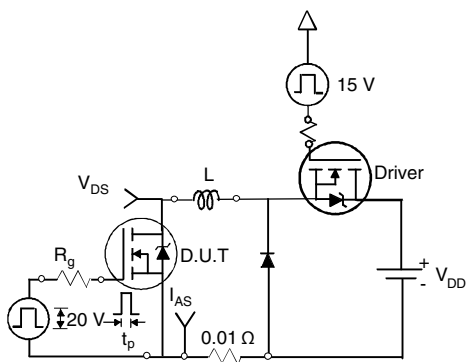


Fig. 12a - Unclamped Inductive Test Circuit

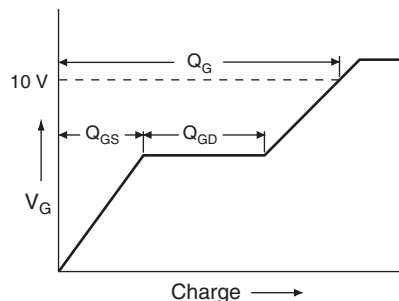


Fig. 13a - Basic Gate Charge Waveform

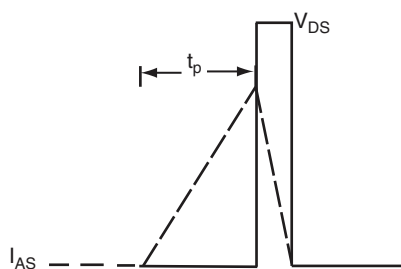


Fig. 12b - Unclamped Inductive Waveforms

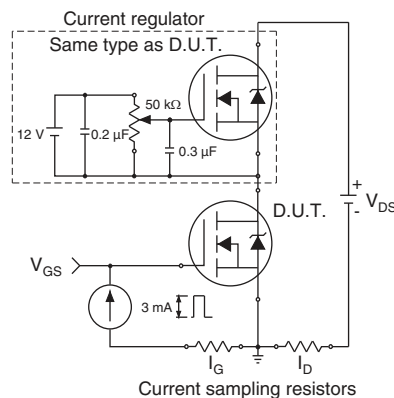
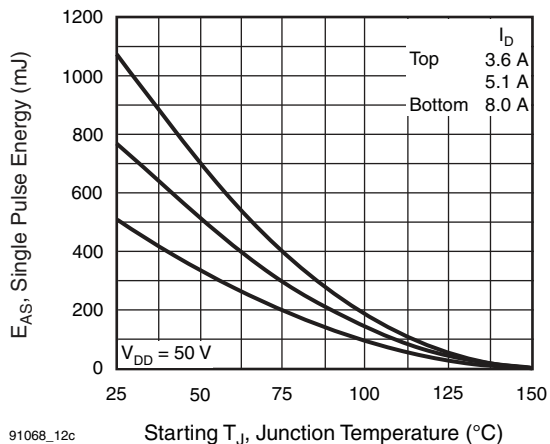
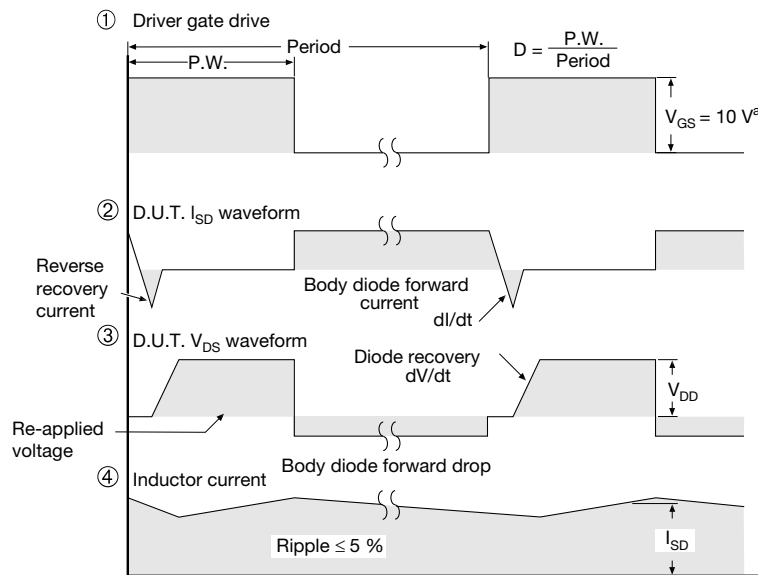
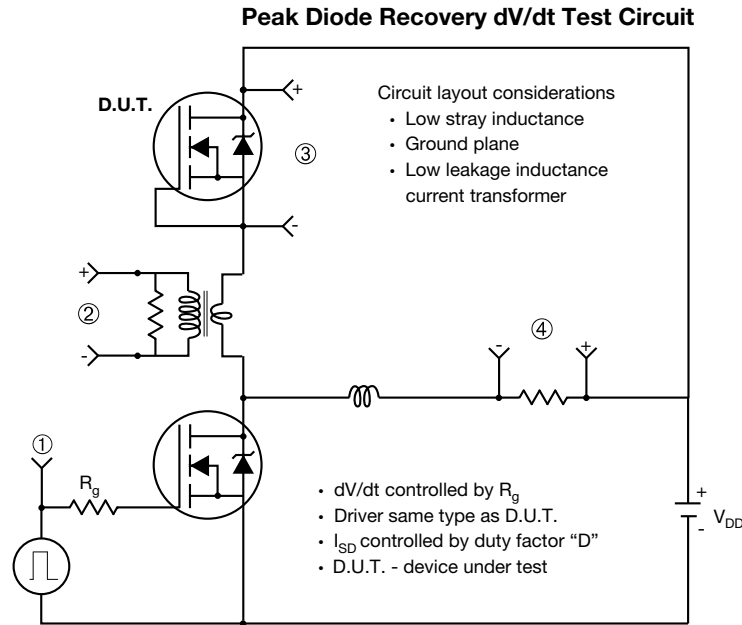


Fig. 13b - Gate Charge Test Circuit



91068_12c

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



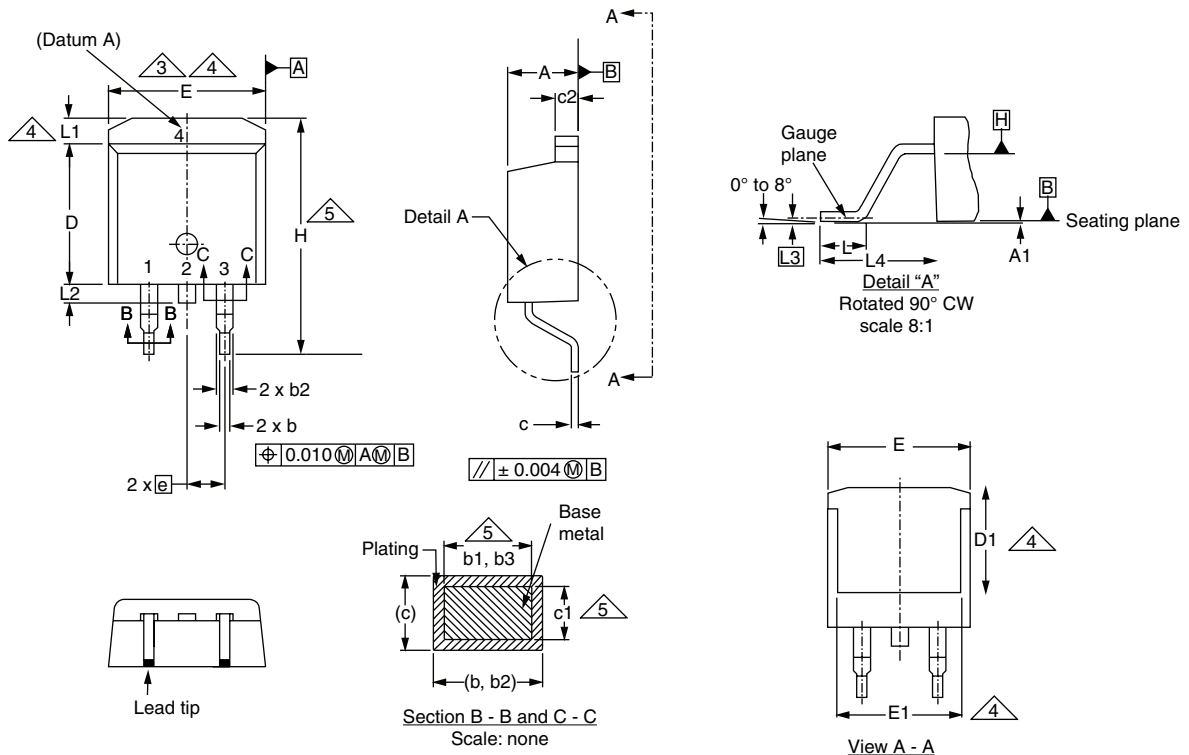
Note
a. $V_{GS} = 5\text{ V}$ for logic level devices

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

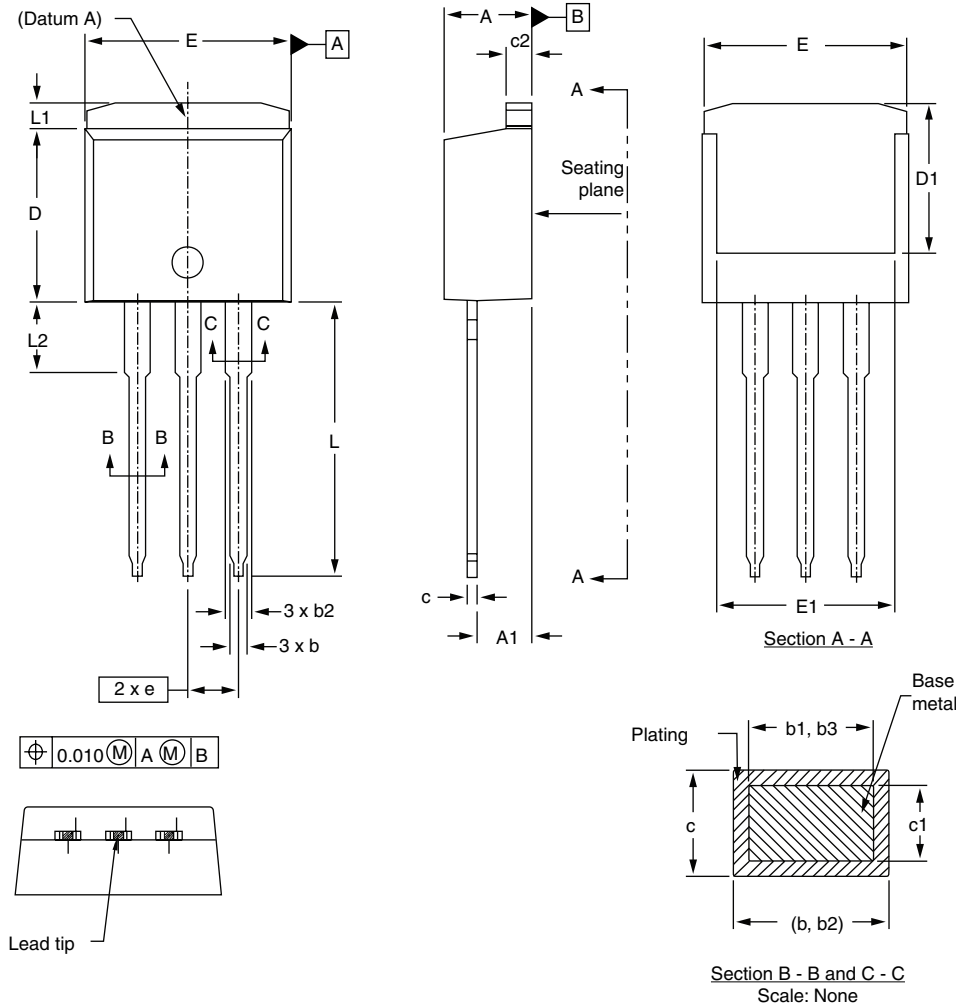
ECN: S-82110-Rev. A, 15-Sep-08
 DWG: 5970

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

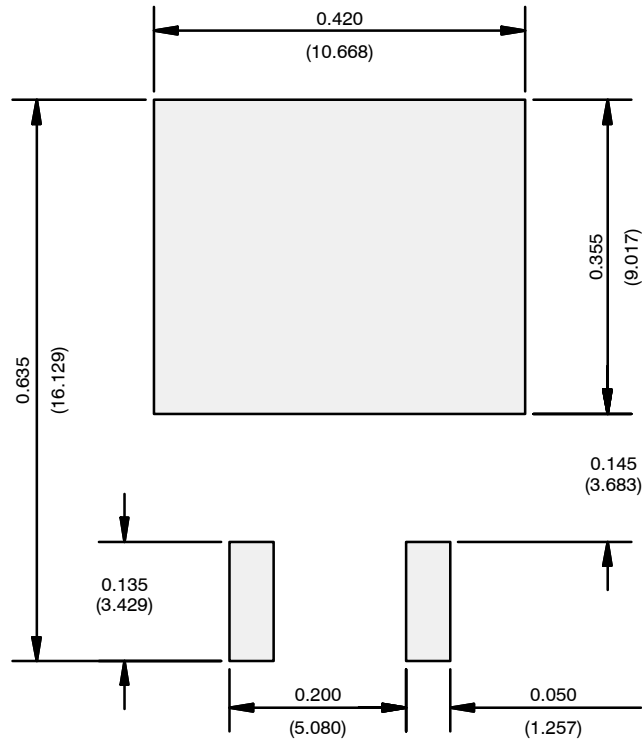
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 DWG: 5977

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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