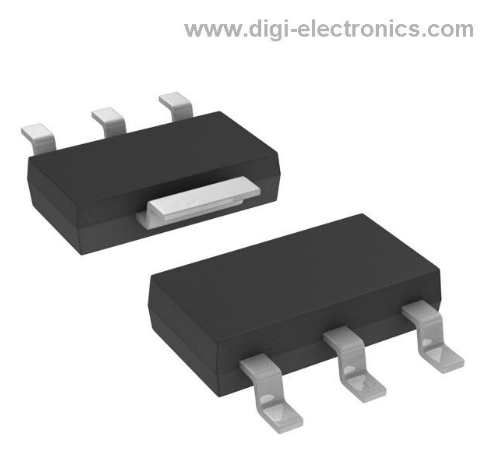
IRLL110 Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	IRLL110-DG
Manufacturer	Vishay Siliconix
Manufacturer Product Number	IRLL110
Description	MOSFET N-CH 100V 1.5A SOT223
Detailed Description	N-Channel 100 V 1.5A (Tc) 2W (Ta), 3.1W (Tc) Surface Mount SOT-223

Purchase and inquiry

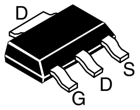
Manufacturer Product Number:	Manufacturer:
IRLL110	Vishay Siliconix
Series:	Product Status:
-	Obsolete
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
100 V	1.5A (Tc)
Drive Voltage (Max Rds On, Min Rds On):	Rds On (Max) @ Id, Vgs:
4V, 5V	540mOhm @ 900mA, 5V
Vgs(th) (Max) @ Id:	Gate Charge (Qg) (Max) @ Vgs:
2V @ 250µA	6.1 nC @ 5 V
Vgs (Max):	Input Capacitance (Ciss) (Max) @ Vds:
±10V	250 pF @ 25 V
FET Feature:	Power Dissipation (Max):
-	2W (Ta), 3.1W (Tc)
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Surface Mount
Supplier Device Package:	Package / Case:
SOT-223	TO-261-4, TO-261AA
Base Product Number:	
IRLL110	

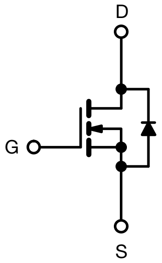
Environmental & Export classification

RoHS Status:	Moisture Sensitivity Level (MSL):
RoHS non-compliant	1 (Unlimited)
REACH Status:	ECCN:
REACH Unaffected	EAR99
HTSUS:	
8541.29.0095	

Power MOSFET

SOT-223





N-Channel MOSFET

Marking code: LB

PRODUCT SUMMARY		
V_{DS} (V)	100	
$R_{DS(on)}$ (Ω)	V_{GS} = 5.0 V	0.54
Q_g (Max.) (nC)	6.1	
Q_{gs} (nC)	2.6	
Q_{gd} (nC)	3.3	
Configuration	Single	

FEATURES

- Surface-mount
- Available in tape and reel
- Dynamic dV/dt rating
- Repetitive avalanche rated
- Logic-level gate drive
- $R_{DS(on)}$ specified at V_{GS} = 4 V and 5 V
- Fast switching
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS
COMPLIANT
HALOGEN
FREE
Available

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 SOT-223 package is designed for surface-mounting using vapor phase, infrared, or wave soldering techniques. Its unique package design allows for easy automatic pick-and-place as with other SOT or SOIC packages but has the added advantage of improved thermal performance due to an enlarged tab for heatsinking. Power dissipation of greater than 1.25 W is possible in a typical surface mount application.

ORDERING INFORMATION	
Package	SOT-223
Lead (Pb)-free and halogen-free	SiHLL110TR-GE3
	IRLL110TRPbF-BE3 [a, b]
Lead (Pb)-free	IRLL110TRPbF [a]

Notes

a. See device orientation
b. "-BE3" denotes alternate manufacturing location

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

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-source voltage			V_{DS}	100	V
Gate-source voltage			V_{GS}	± 10	
Continuous drain current	V_{GS} at 5 V	T_C = 25 °C	I_D	1.5	A
		T_C = 100 °C		0.93	
Pulsed drain current [a]			I_{DM}	12	
Linear derating factor				0.025	W/°C
Linear derating factor (PCB mount) [e]				0.017	
Single pulse avalanche energy [b]			E_{AS}	50	mJ
Avalanche current [a]			I_{AR}	1.5	A
Repetitive avalanche energy [a]			E_{AR}	0.31	mJ
Maximum power dissipation	T_C = 25 °C		P_D	3.1	W
Maximum power dissipation (PCB mount) [e]	T_A = 25 °C			2.0	
Peak diode recovery dV/dt [c]			dV/dt	5.5	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

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11)
b. V_{DD} = 25 V, starting T_J = 25 °C, L = 25 mH, R_g = 25 Ω, I_{AS} = 1.5 A (see fig. 12)
c. $I_{SD} \leq 5.6$ A, dI/dt ≤ 75 A/μs, $V_{DD} \leq V_{DS}$, $T_J \leq 150$ °C
d. 1.6 mm from case

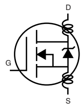
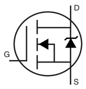
For technical questions, contact: hvm@vishay.com

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

THERMAL RESISTANCE RATINGS				
PARAMETER	**SYMBOL**	**TYP.**	**MAX.**	**UNIT**
Maximum junction-to-ambient (PCB mount) [a]	R_{thJA}	-	60	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	40	

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 V, I_D = 250 μA	100	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA	-	0.12	-	V/°C
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1.0	-	2.0	V
Gate-source leakage	I_{GSS}	V_{GS} = ± 10 V	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 100 V, V_{GS} = 0 V	-	-	25	μA
		V_{DS} = 80 V, V_{GS} = 0 V, T_J = 125 °C	-	-	250	
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS} = 5.0 V I_D = 0.90 A [b]	-	-	0.54	Ω
		V_{GS} = 4.0 V I_D = 0.75 A	-	-	0.76	
Forward transconductance	g_{fs}	V_{DS} = 25 V, I_D = 0.90 A	0.57	-	-	S
Dynamic						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1.0 MHz, see fig. 5	-	250	-	pF
Output capacitance	C_{oss}		-	80	-	
Reverse transfer capacitance	C_{rss}		-	15	-	
Total gate charge	Q_g	V_{GS} = 5.0 V I_D = 5.6 A, V_{DS} = 80 V, see fig. 6 and 13 [b]	-	-	6.1	nC
Gate-source charge	Q_{gs}		-	-	2.6	
Gate-drain charge	Q_{gd}		-	-	3.3	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 50 V, I_D = 5.6 A, R_g = 12 Ω, R_D = 8.4 Ω	-	9.3	-	ns
Rise time	t_r		-	47	-	
Turn-off delay time	$t_{d(off)}$		-	16	-	
Fall time	t_f		-	18	-	
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 	-	-	1.5	A
Pulsed diode forward current [a]	I_{SM}		-	-	12	
Body diode voltage	V_{SD}	T_J = 25 °C, I_S = 1.5 A, V_{GS} = 0 V [b]	-	-	2.5	V
Body diode reverse recovery time	t_{rr}	T_J = 25 °C, I_F = 5.6 A, dI/dt = 100 A/μs [b]	-	110	130	ns
Body diode reverse recovery charge	Q_{rr}		-	0.50	0.65	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 %.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

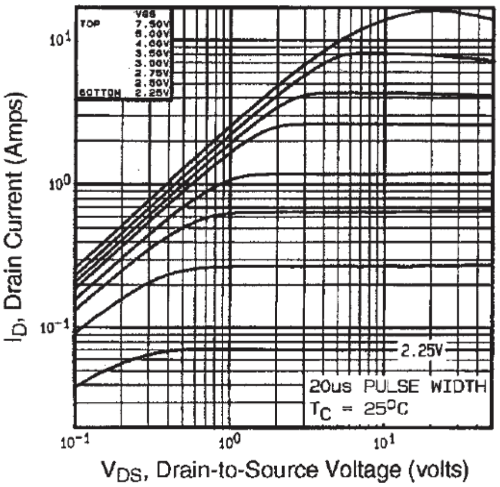


Fig. 1 - Typical Output Characteristics

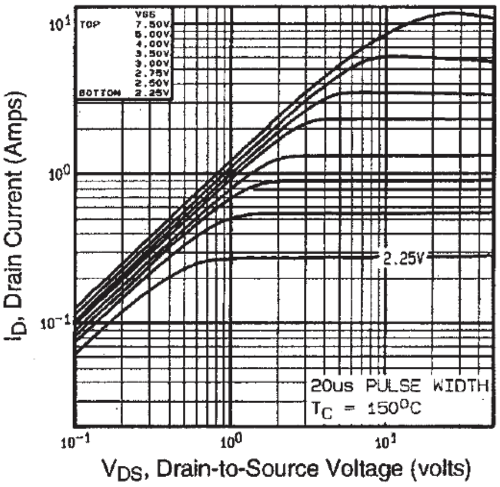


Fig. 2 - Typical Output Characteristics

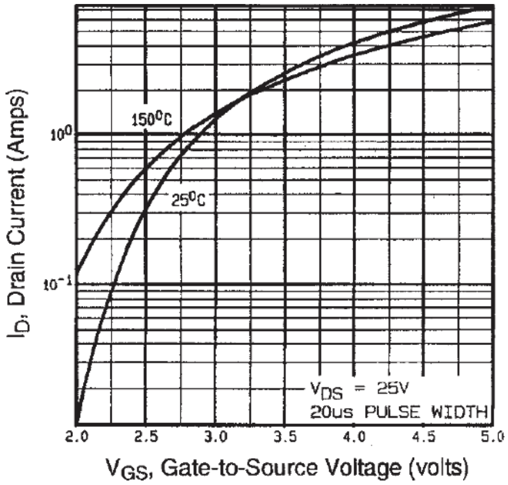


Fig. 3 - Typical Transfer Characteristics

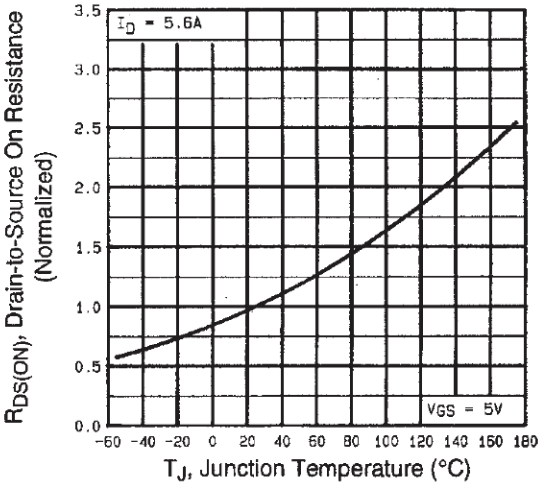


Fig. 4 - Normalized On-Resistance vs. Temperature

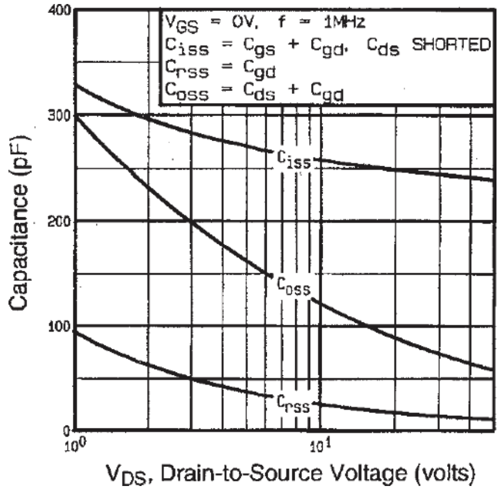


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

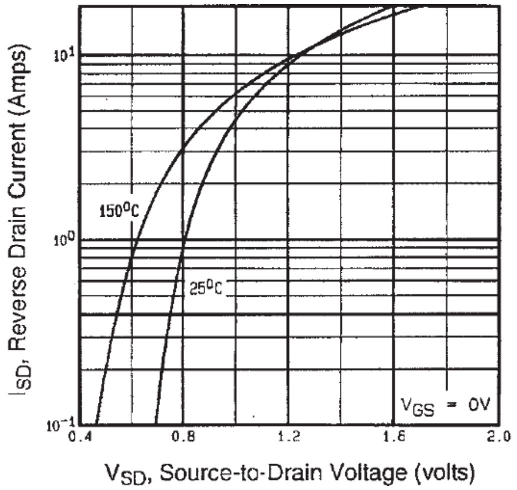


Fig. 7 - Typical Source-Drain Diode Forward Voltage

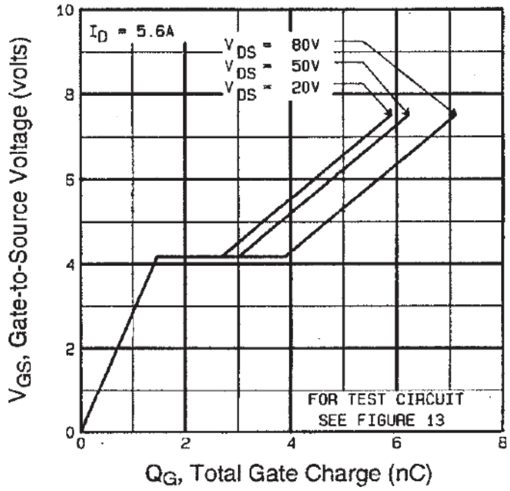


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

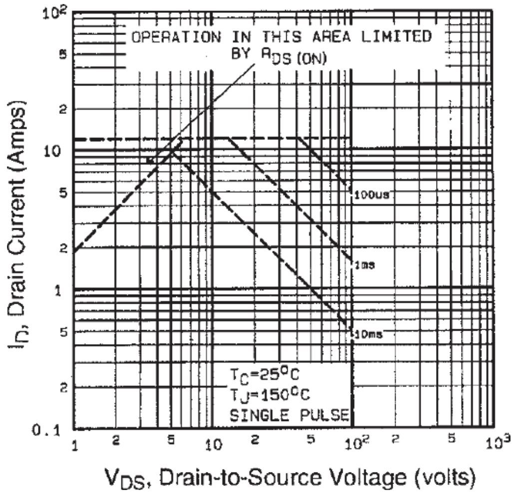


Fig. 8 - Maximum Safe Operating Area

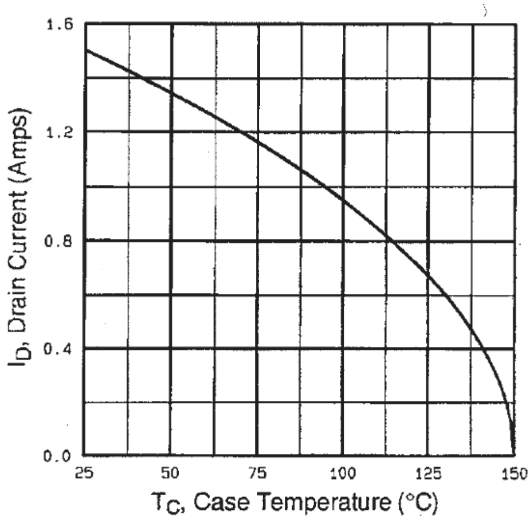


Fig. 9 - Maximum Drain Current vs. Case Temperature

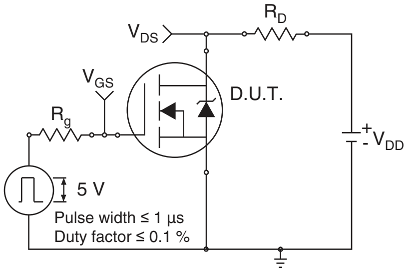


Fig. 10a - Switching Time Test Circuit

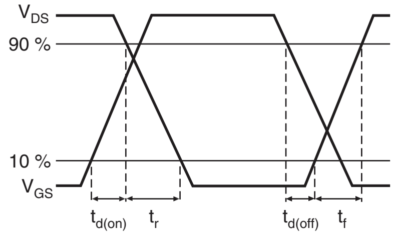


Fig. 10b - Switching Time Waveforms

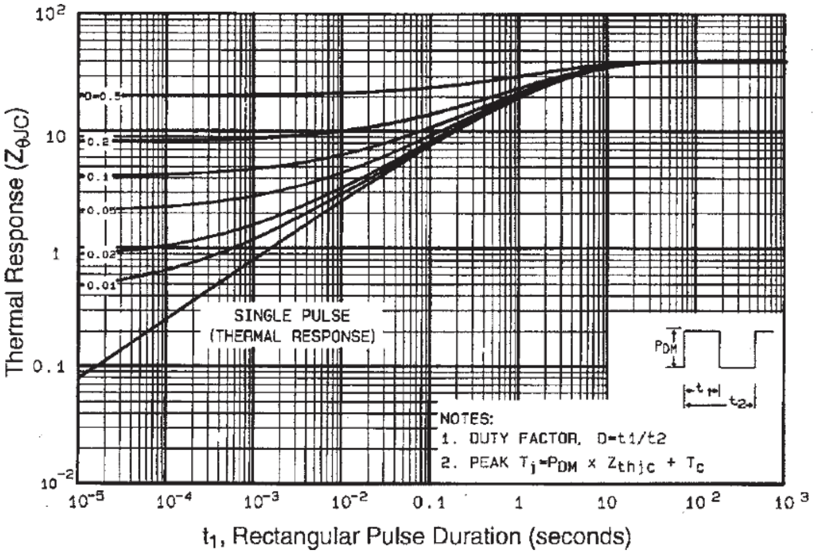


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

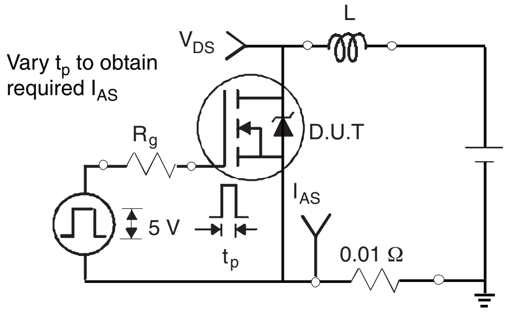


Fig. 12a - Unclamped Inductive Test Circuit

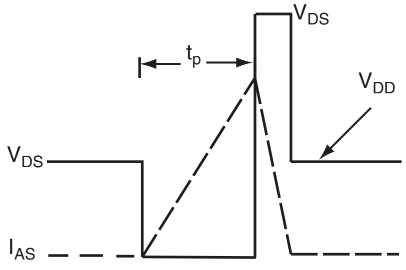


Fig. 12b - Unclamped Inductive Waveforms

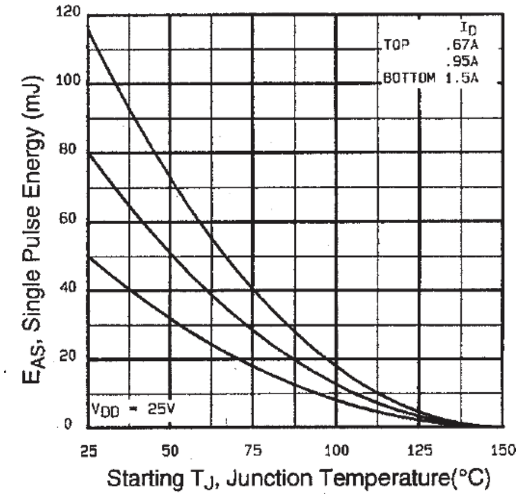


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

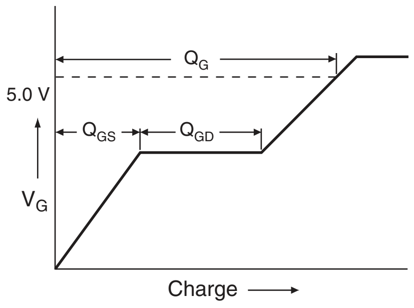


Fig. 13a - Basic Gate Charge Waveform

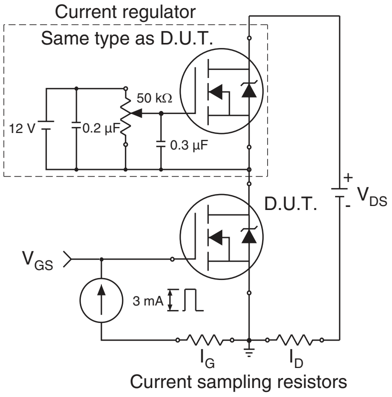
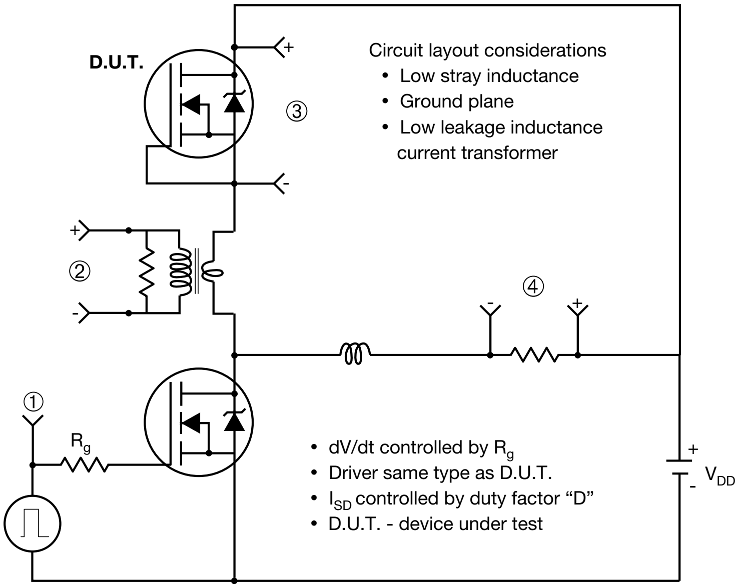


Fig. 13b - Gate Charge Test Circuit

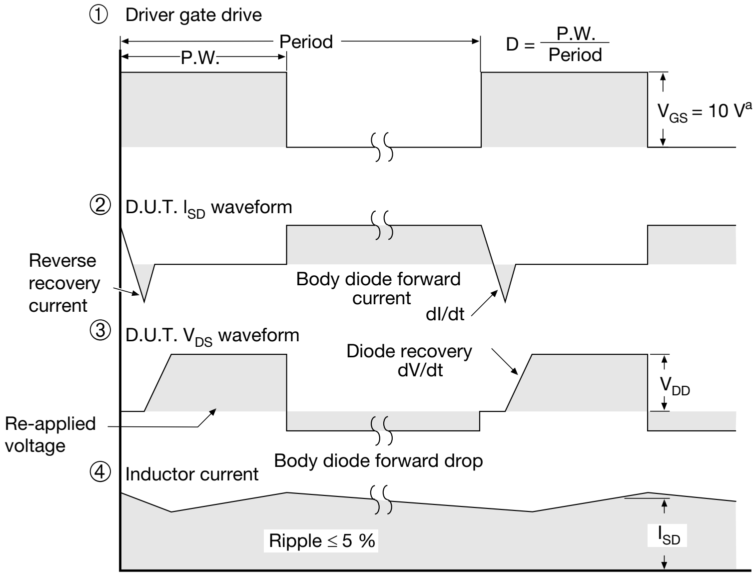
Peak Diode Recovery dV/dt Test Circuit



Circuit layout considerations

- Low stray inductance
- Ground plane
- Low leakage inductance current transformer

- dV/dt controlled by R_g
- Driver same type as D.U.T.
- I_{SD} controlled by duty factor "D"
- D.U.T. - device under test

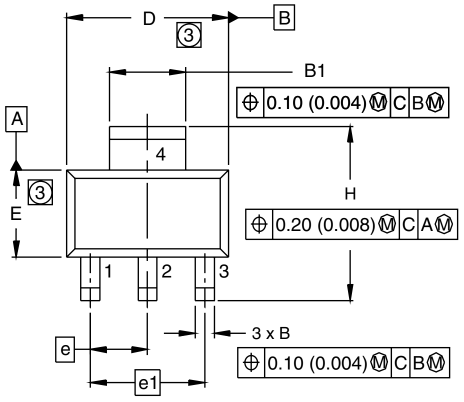


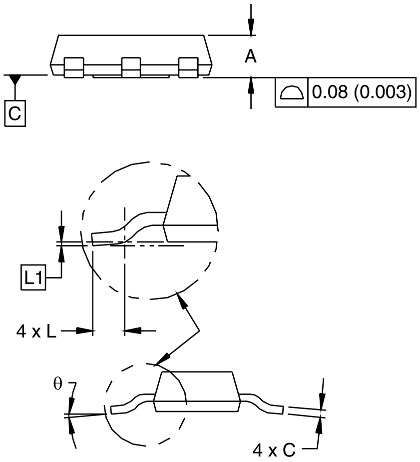
Note

a. V_{GS} = 5 V for logic level devices

Fig. 14 - For N-Channel

SOT-223 (HIGH VOLTAGE)





	MILLIMETERS		INCHES	
DIM.	**MIN.**	**MAX.**	**MIN.**	**MAX.**
A	1.55	1.80	0.061	0.071
B	0.65	0.85	0.026	0.033
B1	2.95	3.15	0.116	0.124
C	0.25	0.35	0.010	0.014
D	6.30	6.70	0.248	0.264
E	3.30	3.70	0.130	0.146
e	2.30 BSC		0.0905 BSC	
e1	4.60 BSC		0.181 BSC	
H	6.71	7.29	0.264	0.287
L	0.91	-	0.036	-
L1	0.061 BSC		0.0024 BSC	
θ	-	10'	-	10'
ECN: S-82109-Rev. A, 15-Sep-08 DWG: 5969				

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension do not include mold flash.
4. Outline conforms to JEDEC outline TO-261AA.

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

OUR CERTIFICATE

DiGi provide top-quality products and perfect service for customer worldwide through standardization, technological innovation and continuous improvement. DiGi through third-party certification, we striciy control the quality of products and services. Welcome your RFQ to Email: Info@DiGi-Electronics.com

DCI.

QUALITY MANAGEMENT SYSTEM CERTIFICATE

DIGI ELECTRONICS HK LIMITED

GB/T 19001-2016 idt ISO9001:2015

DCI Certification Ltd

DCI.

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE

DIGI ELECTRONICS HK LIMITED

GB/T 24001-2016 idt ISO14001:2015

DCI Certification Ltd

DCI.

OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM CERTIFICATE

DIGI ELECTRONICS HK LIMITED

GB/T45001-2020 idt ISO45001:2018

DCI Certification Ltd

CR

CERTIFICATE OF INCORPORATION

I hereby certify that

is this day incorporated in Hong Kong under the Companies Ordinance

(Chapter 622 of the Laws of Hong Kong), and that this company is

a limited company.

Registrar of Companies

Hong Kong Special Administrative Region

ASA

MEMBERSHIP

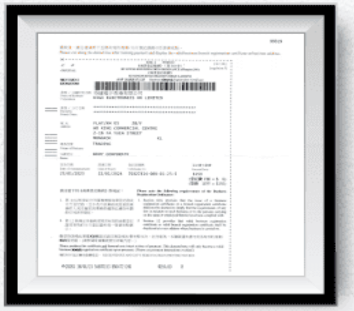
Certificate

DIGI ELECTRONICS HK LIMITED

dun & bradstreet

A Dun & Bradstreet

D-U-N-S® Registered™ Business



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.