

Power MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	250
$R_{DS(on)}$ (Ω)	$V_{GS} = 10\text{ V}$ 2.0
Q_g (Max.) (nC)	8.2
Q_{gs} (nC)	1.8
Q_{gd} (nC)	4.5
Configuration	Single

FEATURES

- Surface Mount
- Available in Tape and Reel
- Dynamic dV/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

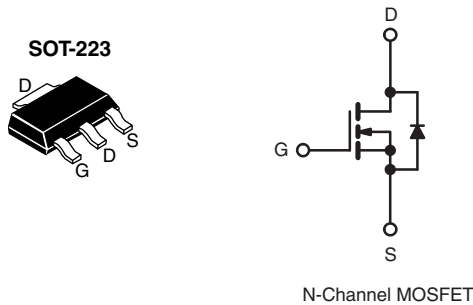


RoHS
COMPLIANT
HALOGEN
FREE
Available

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	SOT-223
Lead (Pb)-free and Halogen-free	SiHFL214-GE3	SiHFL214TR-GE3 ^a
Lead (Pb)-free	IRFL214PbF	IRFL214TRPbF ^a
	SiHFL214-E3	SiHFL214T-E3 ^a

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}	250	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current	V_{GS} at 10 V	I_D	$T_C = 25\text{ }^\circ\text{C}$	A
			$T_C = 100\text{ }^\circ\text{C}$	
Pulsed Drain Current ^a		I_{DM}	6.3	W/ $^\circ\text{C}$
Linear Derating Factor			0.025	
Linear Derating Factor (PCB Mount) ^e			0.017	
Single Pulse Avalanche Energy ^b		E_{AS}	50	mJ
Repetitive Avalanche Current ^a		I_{AR}	0.79	A
Repetitive Avalanche Energy ^a		E_{AR}	0.31	mJ
Maximum Power Dissipation	$T_C = 25\text{ }^\circ\text{C}$	P_D	3.1	W
	Maximum Power Dissipation (PCB Mount) ^e		$T_A = 25\text{ }^\circ\text{C}$	
Peak Diode Recovery dV/dt^c		dV/dt	4.8	V/ns
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$
Soldering Recommendations (Peak Temperature) ^d	for 10 s		300	

Notes

- Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- $V_{DD} = 50\text{ V}$, starting $T_J = 25\text{ }^\circ\text{C}$, $L = 128\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 0.79\text{ A}$ (see fig. 12).
- $I_{SD} \leq 2.7\text{ A}$, $dI/dt \leq 65\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DS}$, $T_J \leq 150\text{ }^\circ\text{C}$.
- 1.6 mm from case.
- When mounted on 1" square PCB (FR-4 or G-10 material).



THERMAL RESISTANCE RATINGS					
PARAMETER	SYMBOL	MIN.	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 ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$		250	-	-	V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^\circ\text{C}$, $I_D = 1\text{ mA}$		-	0.39	-	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}	$V_{GS} = \pm 20\text{ V}$		-	-	± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 250\text{ V}$, $V_{GS} = 0\text{ V}$		-	-	25	μA
		$V_{DS} = 200\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^\circ\text{C}$		-	-	250	
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$	$I_D = 0.47\text{ A}^b$	-	-	2.0	Ω
Forward Transconductance	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 0.47\text{ A}$		0.50	-	-	S
Dynamic							
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1.0\text{ MHz}$, see fig. 5		-	140	-	pF
Output Capacitance	C_{oss}			-	42	-	
Reverse Transfer Capacitance	C_{riss}			-	9.6	-	
Total Gate Charge	Q_g	$V_{GS} = 10\text{ V}$	$I_D = 2.7\text{ A}$, $V_{DS} = 200\text{ V}$, see fig. 6 and 13 ^b	-	-	8.2	nC
Gate-Source Charge	Q_{gs}			-	-	1.8	
Gate-Drain Charge	Q_{gd}			-	-	4.5	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 125\text{ V}$, $I_D = 2.7\text{ A}$, $R_g = 24\text{ }\Omega$, $R_D = 45\text{ }\Omega$, see fig. 10 ^b		-	7.0	-	ns
Rise Time	t_r			-	7.6	-	
Turn-Off Delay Time	$t_{d(off)}$			-	16	-	
Fall Time	t_f			-	7.0	-	
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		-	-	0.79	A
Pulsed Diode Forward Current ^a	I_{SM}			-	-	6.3	
Body Diode Voltage	V_{SD}	$T_J = 25\text{ }^\circ\text{C}$, $I_S = 0.79\text{ A}$, $V_{GS} = 0\text{ V}^b$		-	-	2.0	V
Body Diode Reverse Recovery Time	t_{rr}	$T_J = 25\text{ }^\circ\text{C}$, $I_F = 2.7\text{ A}$, $dI/dt = 100\text{ A}/\mu\text{s}^b$		-	190	390	ns
Body Diode Reverse Recovery Charge	Q_{rr}			-	0.64	1.3	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 $\leq 300\text{ }\mu\text{s}$; duty cycle $\leq 2\text{ }\%$.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

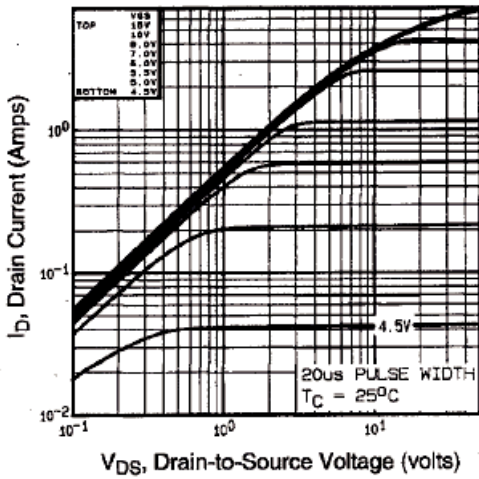


Fig. 1 - Typical Output Characteristics

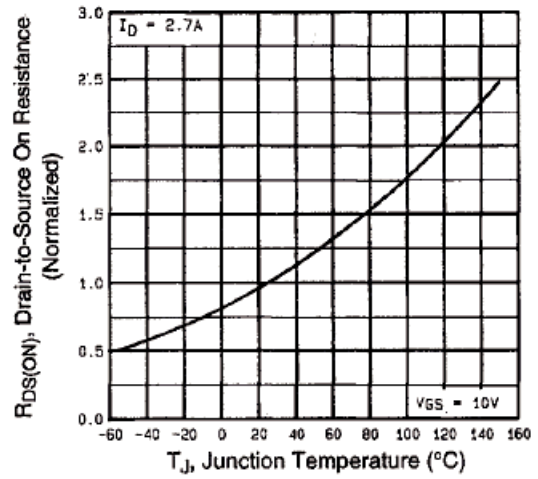


Fig. 4 - Normalized On-Resistance vs. Temperature

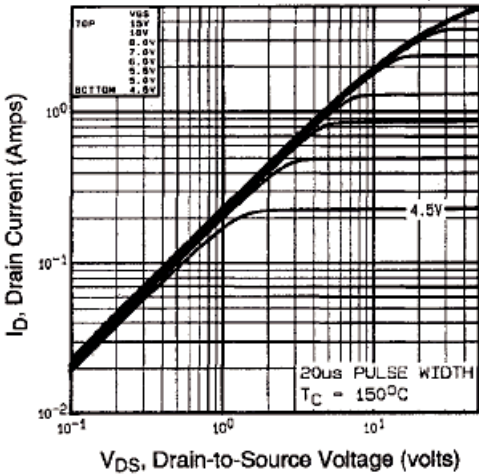


Fig. 2 - Typical Output Characteristics

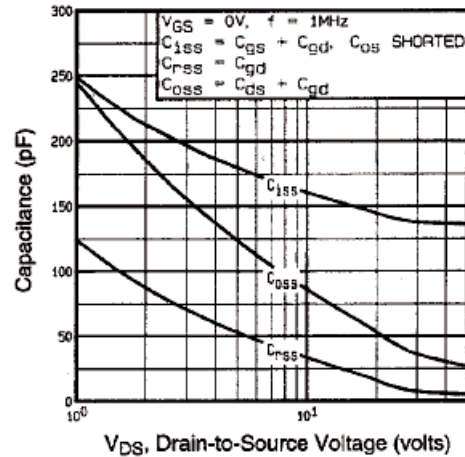


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

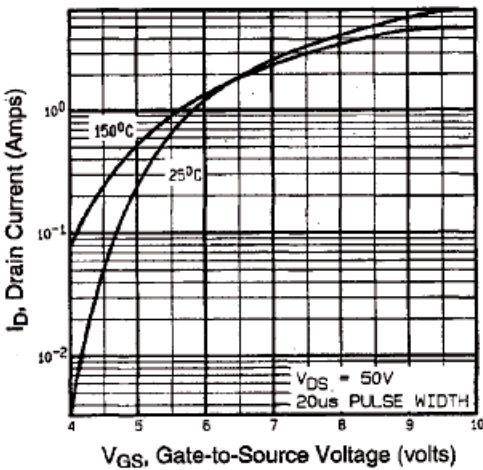


Fig. 3 - Typical Transfer Characteristics

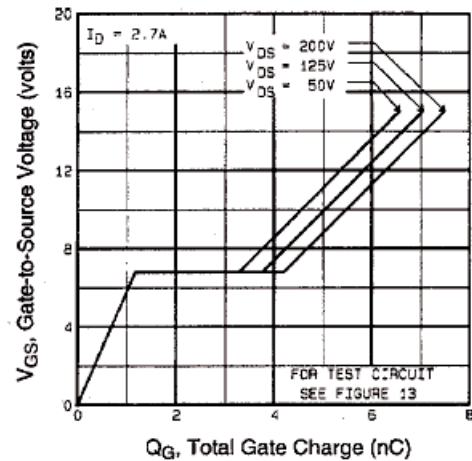


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

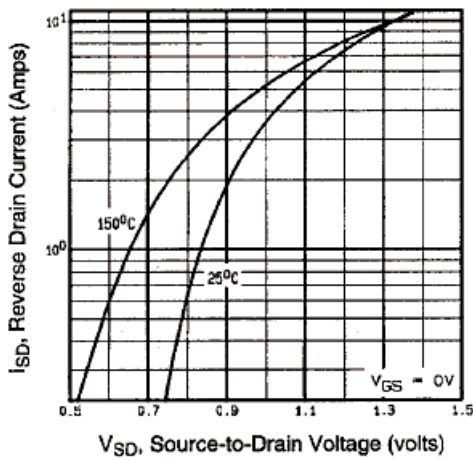


Fig. 7 - Typical Source-Drain Diode Forward Voltage

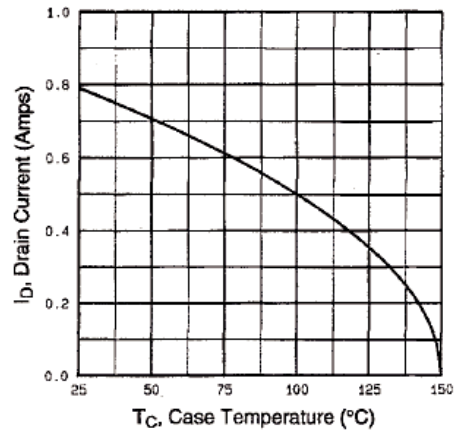


Fig. 9 - Maximum Drain Current vs. Case Temperature

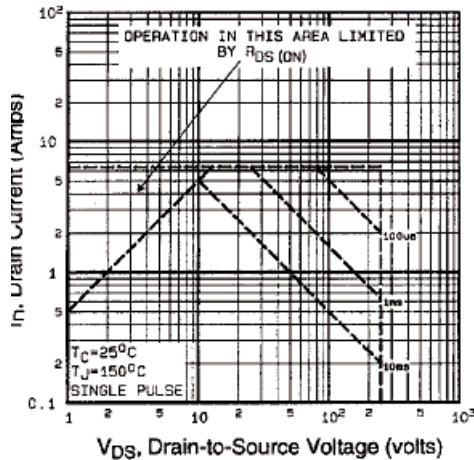


Fig. 8 - Maximum Safe Operating Area

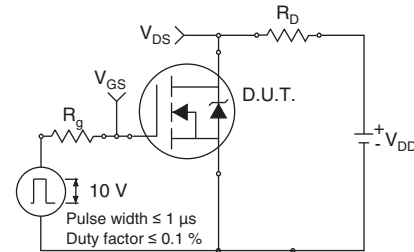


Fig. 10a - Switching Time Test Circuit

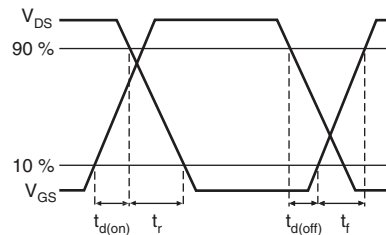


Fig. 10b - Switching Time Waveforms

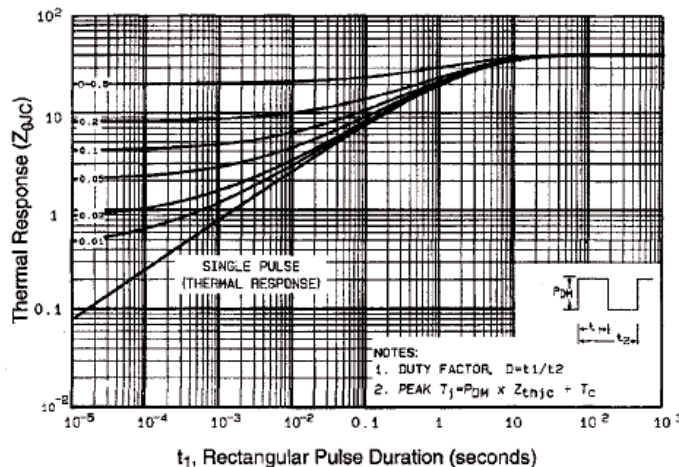


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

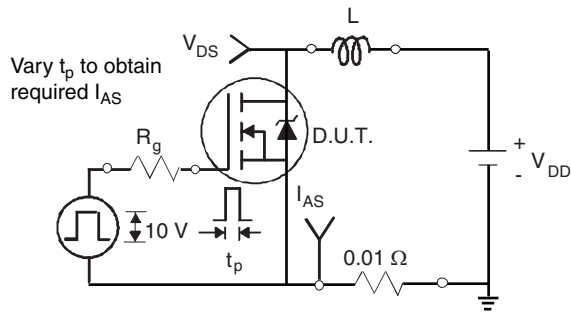


Fig. 12a - Unclamped Inductive Test Circuit

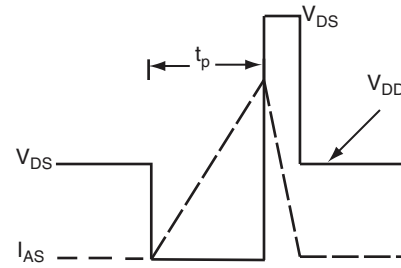


Fig. 12b - Unclamped Inductive Waveforms

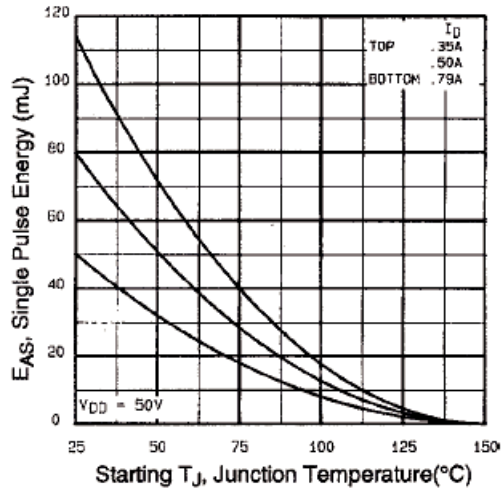


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

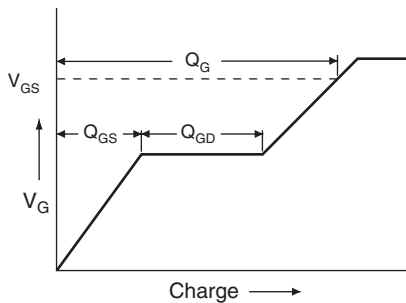


Fig. 13a - Basic Gate Charge Waveform

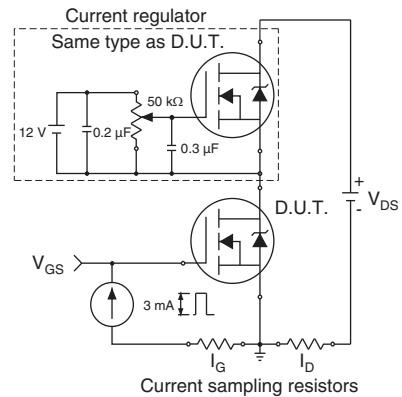


Fig. 13b - Gate Charge Test Circuit

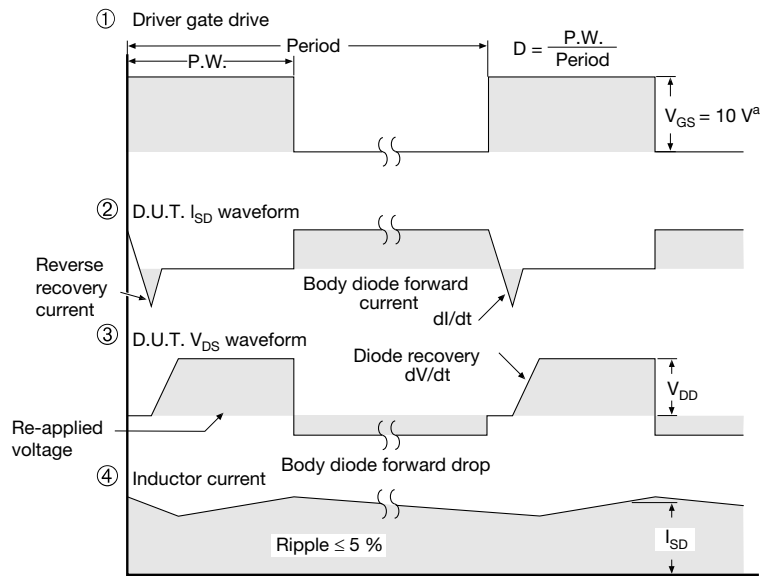
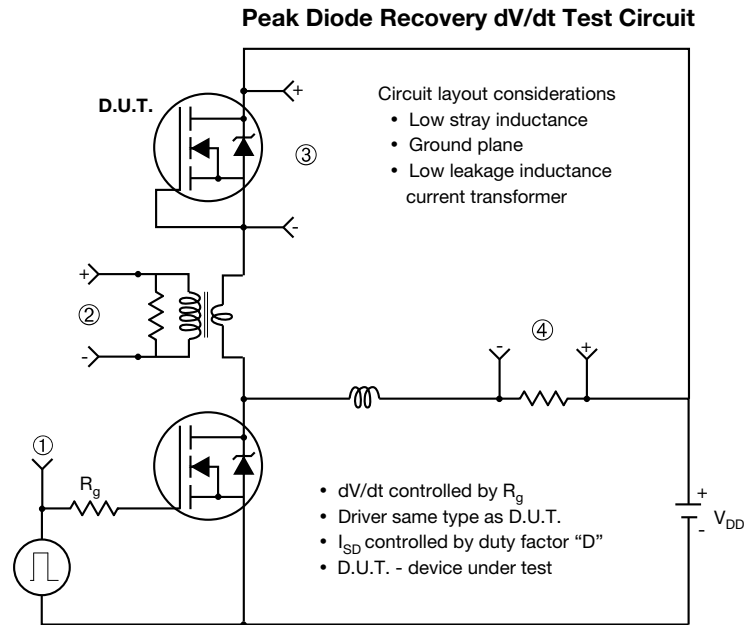
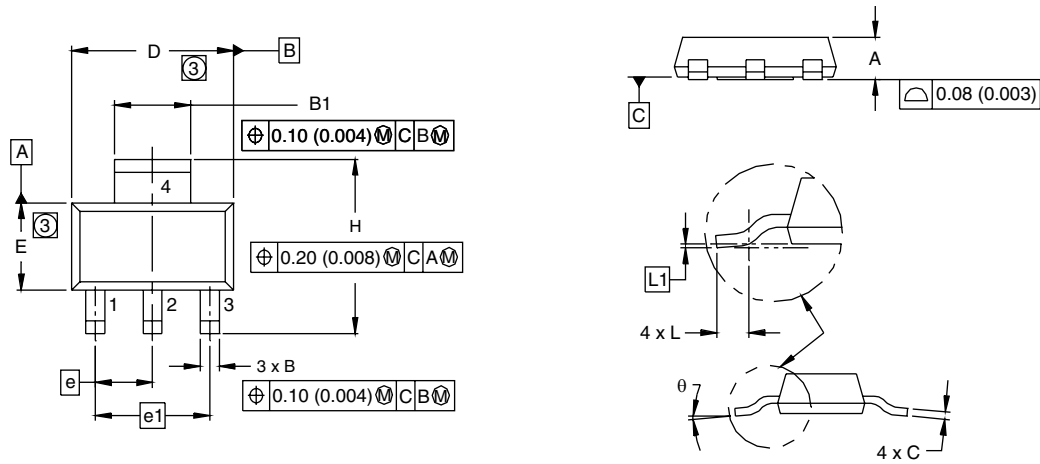


Fig.14 - For N-Channel

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SOT-223 (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	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.



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Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.