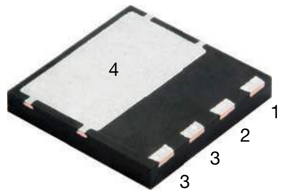
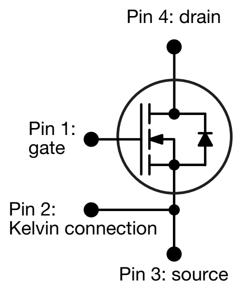
E Series Power MOSFET

PowerPAK® 8 x 8





N-Channel MOSFET

FEATURES

- 4th generation E series technology
- Low figure-of-merit (FOM) R_{on} x Q_g
- Low effective capacitance ($C_{o(er)}$)
- Reduced switching and conduction losses
- Avalanche energy rated (UIS)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE

APPLICATIONS

- Server and telecom power supplies
- Switch mode power supplies (SMPS)
- Power factor correction power supplies (PFC)
- Lighting
  - High-intensity discharge (HID)
  - Fluorescent ballast lighting
- Industrial
  - Welding
  - Induction heating
  - Motor drives
  - Battery chargers
  - Solar (PV inverters)

PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	650	
$R_{DS(on)}$ typ. (Ω) at 25 °C	V_{GS} = 10 V	0.137
Q_g max. (nC)	36	
Q_{gs} (nC)	10	
Q_{gd} (nC)	6	
Configuration	Single	

ORDERING INFORMATION	
Package	PowerPAK® 8 x 8
Lead (Pb)-free and halogen-free	SiHH150N60E-T1-GE3

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

PARAMETER			SYMBOL	LIMIT	UNIT
Drain-source voltage			V_{DS}	600	V
Gate-source voltage			V_{GS}	± 30	
Continuous drain current (T_J = 150 °C)	V_{GS} at 10 V	T_C = 25 °C	I_D	19	A
		T_C = 100 °C		12	
Pulsed drain current [a]			I_{DM}	43	
Linear derating factor				1.04	W/°C
Single pulse avalanche energy [b]			E_{AS}	179	mJ
Maximum power dissipation			P_D	156	W
Operating junction and storage temperature range			T_J, T_{stg}	-55 to +150	°C
Drain-source voltage slope		T_J = 125 °C	dv/dt	100	V/ns
Reverse diode dv/dt [d]				5	

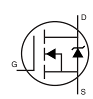
Notes

a. Repetitive rating; pulse width limited by maximum junction temperature

b. V_{DD} = 120 V, starting T_J = 25 °C, L = 28.2 mH, R_g = 25 Ω, I_{AS} = 2.8 A

c. $I_{SD} \leq I_D$, di/dt = 100 A/μs, starting T_J = 25 °C

THERMAL RESISTANCE RATINGS				
PARAMETER	**SYMBOL**	**TYP.**	**MAX.**	**UNIT**
Maximum junction-to-ambient	R_{thJA}	42	55	°C/W
Maximum junction-to-case (drain)	R_{thJC}	0.72	0.96	

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	600	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	Reference to 25 °C, I_D = 1 mA	-	0.62	-	V/°C
Gate-source threshold voltage (N)	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	3.0	-	5.0	V
Gate-source leakage	I_{GSS}	V_{GS} = ± 20 V	-	-	± 100	nA
		V_{GS} = ± 30 V	-	-	± 1	μA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 600 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 480 V, V_{GS} = 0 V, T_J = 125 °C	-	-	10	
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 10 A	-	0.137	0.158	Ω
Forward transconductance [a]	g_{fs}	V_{DS} = 10 V, I_D = 10 A	-	5.1	-	S
Dynamic						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 100 V, f = 100 KHz	-	1514	-	pF
Output capacitance	C_{oss}		-	60	-	
Reverse transfer capacitance	C_{rss}		-	2	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{DS} = 0 V to 400 V, V_{GS} = 0 V	-	58	-	
Effective output capacitance, time related	$C_{o(tr)}$		-	322	-	
Total gate charge	Q_g	V_{GS} = 10 V, I_D = 10 A, V_{DS} = 480 V	-	24	36	nC
Gate-source charge	Q_{gs}		-	10	-	
Gate-drain charge	Q_{gd}		-	6	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 480 V, I_D = 10 A, V_{GS} = 10 V, R_g = 9.1 Ω	-	20	40	ns
Rise time	t_r		-	27	54	
Turn-off delay time	$t_{d(off)}$		-	28	56	
Fall time	t_f		-	17	34	
Gate input resistance	R_g	f = 1 MHz, open drain	0.4	0.9	1.8	Ω
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	22	A
Pulsed diode forward current	I_{SM}		-	-	43	
Diode forward voltage	V_{SD}	T_J = 25 °C, I_S = 10 A, V_{GS} = 0 V	-	-	1.2	V
Reverse recovery time	t_{rr}	T_J = 25 °C, I_F = I_S = 10 A, di/dt = 100 A/μs, V_R = 25 V	-	291	582	ns
Reverse recovery charge	Q_{rr}		-	3.5	7.0	μC
Reverse recovery current	I_{RRM}		-	21	-	A

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

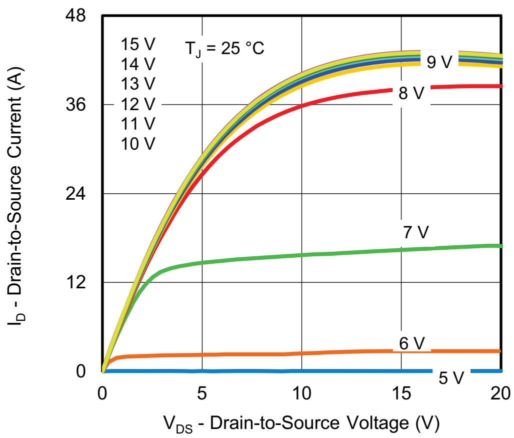


Fig. 1 - Typical Output Characteristics

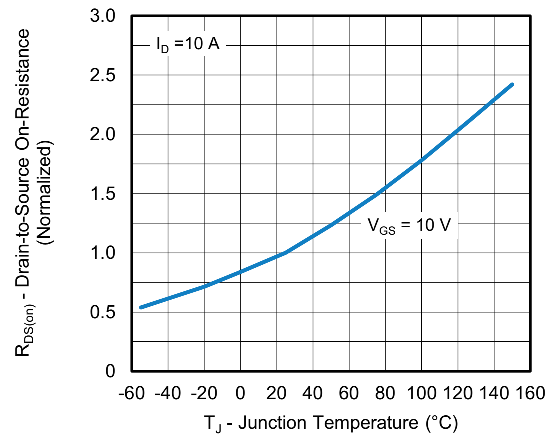


Fig. 4 - Normalized On-Resistance vs. Temperature

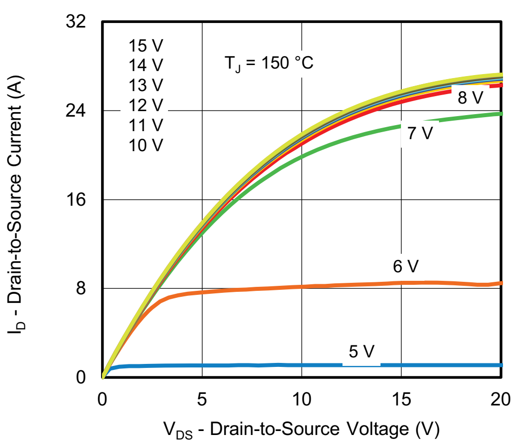


Fig. 2 - Typical Output Characteristics

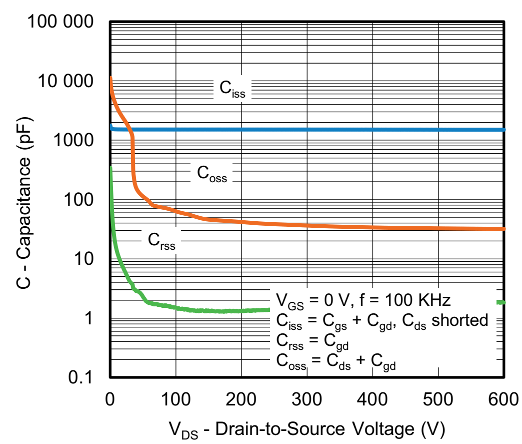


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

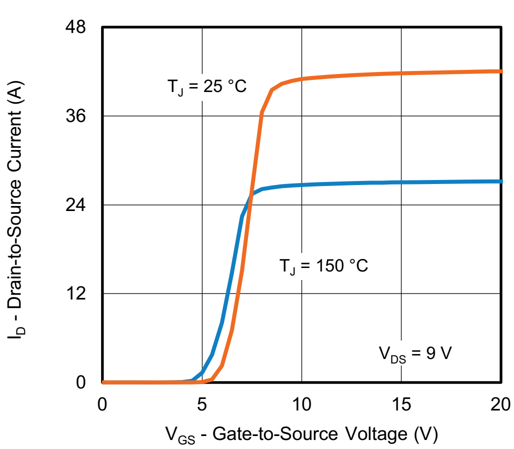


Fig. 3 - Typical Transfer Characteristics

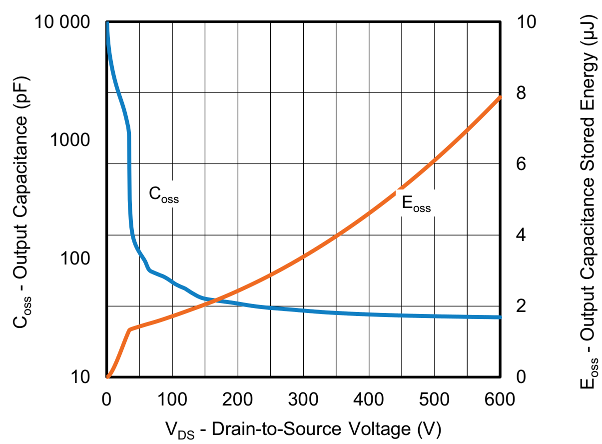


Fig. 6 - C_{oss} and E_{oss} vs. V_{DS}

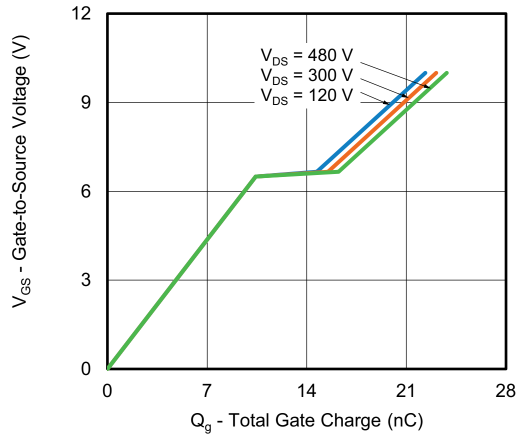


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

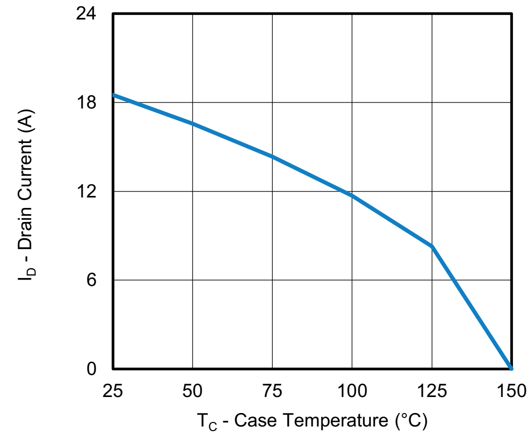


Fig. 9 - Maximum Drain Current vs. Case Temperature

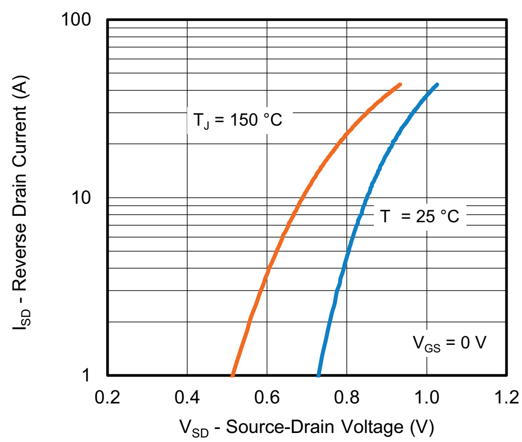


Fig. 8 - Typical Source-Drain Diode Forward Voltage

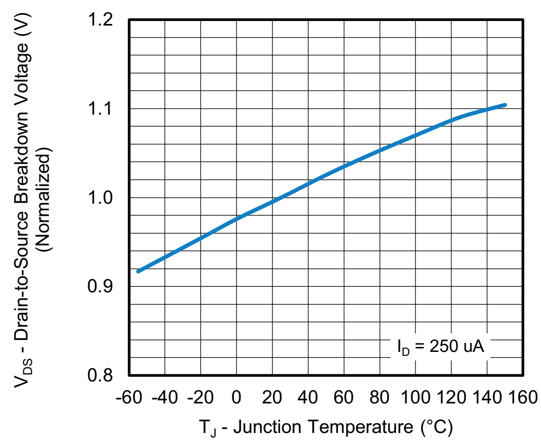


Fig. 10 - Temperature vs. Drain-to-Source Voltage

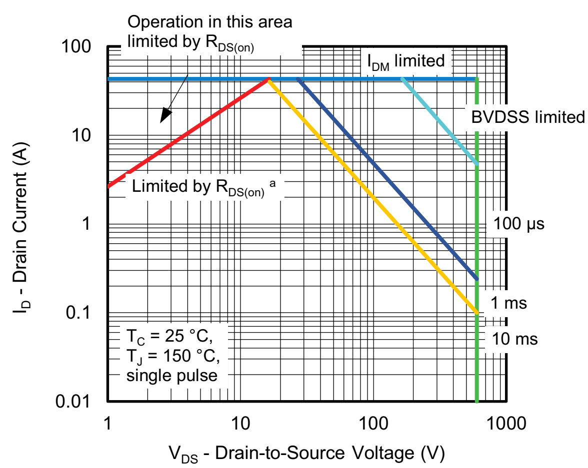


Fig. 11 - Maximum Safe Operating Area

Note

d. V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

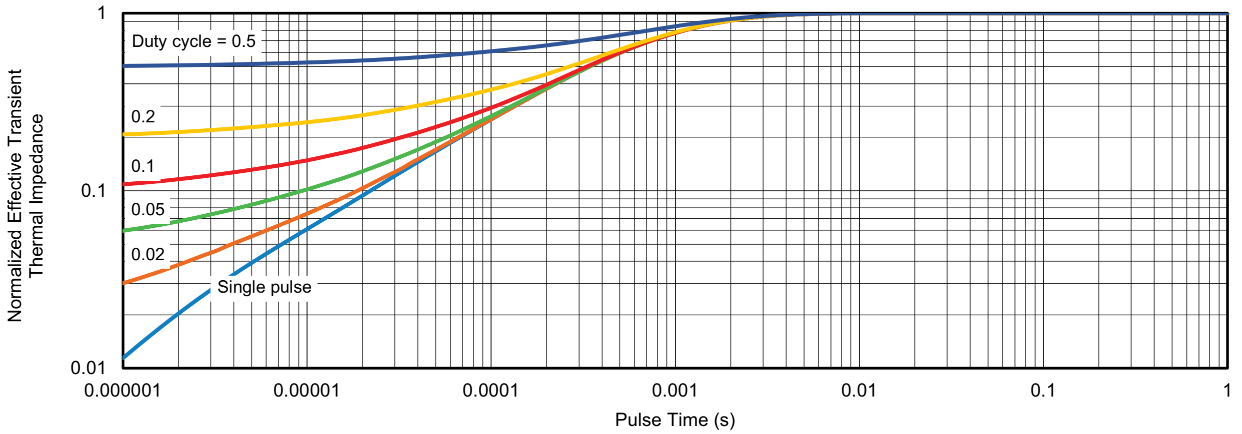


Fig. 12 - Normalized Transient Thermal Impedance, Junction-to-Case

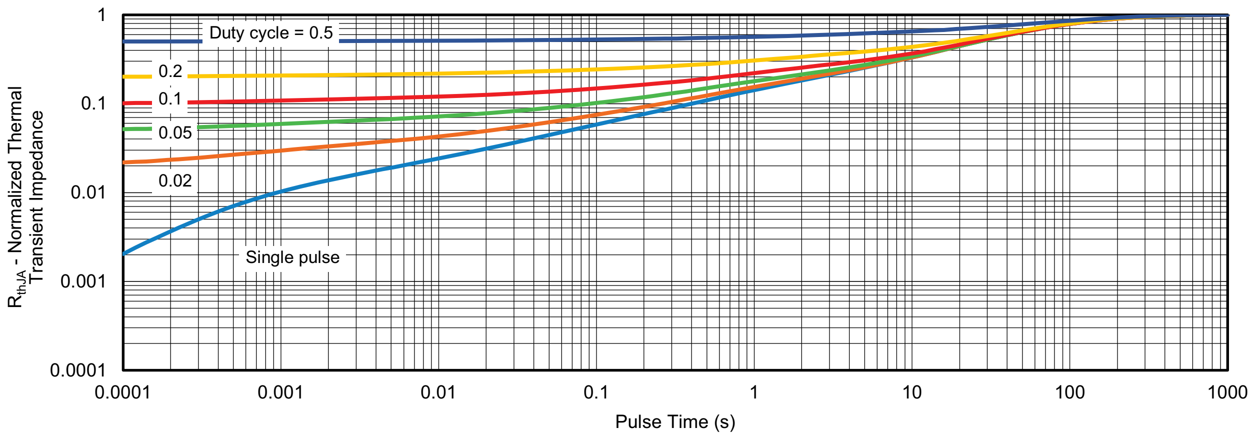


Fig. 13 - Normalized Transient Thermal Impedance, Junction-to-Ambient

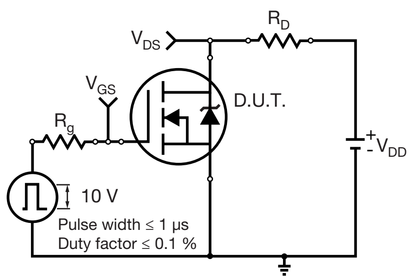


Fig. 14 - Switching Time Test Circuit

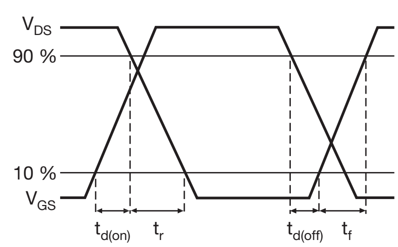


Fig. 15 - Switching Time Waveforms

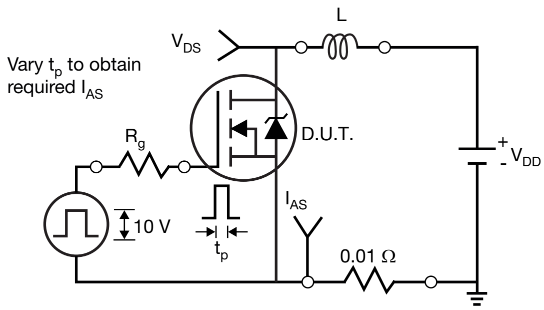


Fig. 16 - Unclamped Inductive Test Circuit

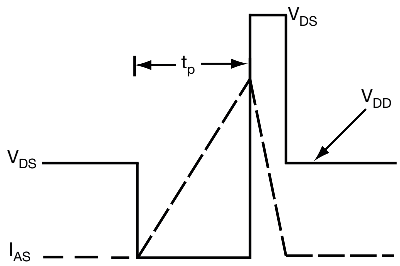


Fig. 17 - Unclamped Inductive Waveforms

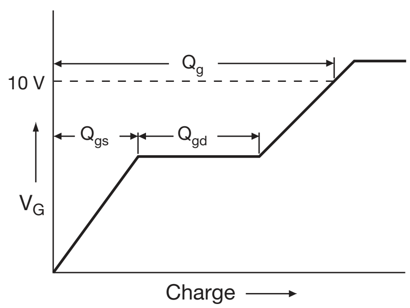


Fig. 18 - Basic Gate Charge Waveform

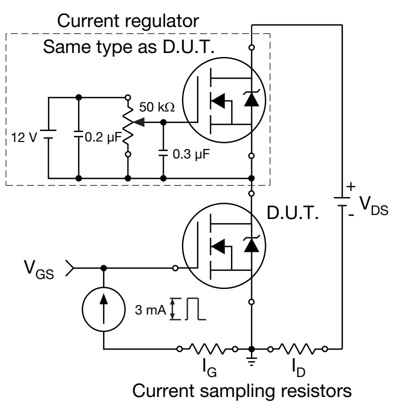
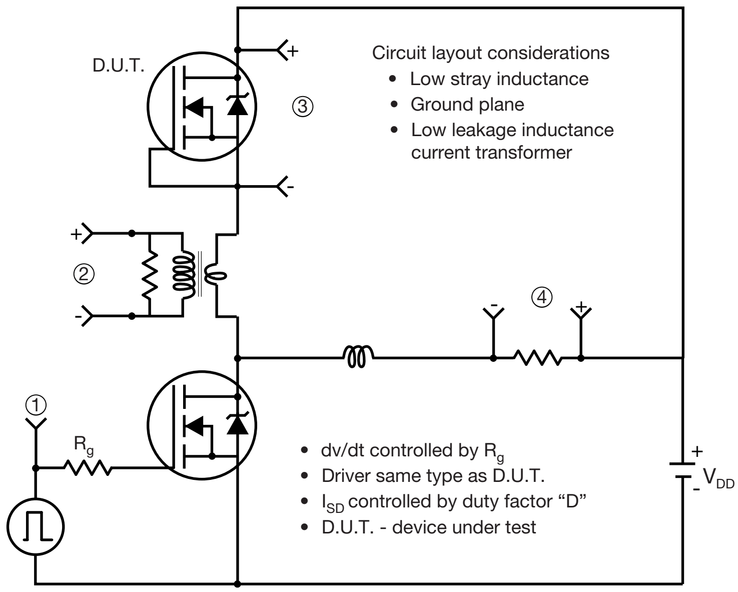
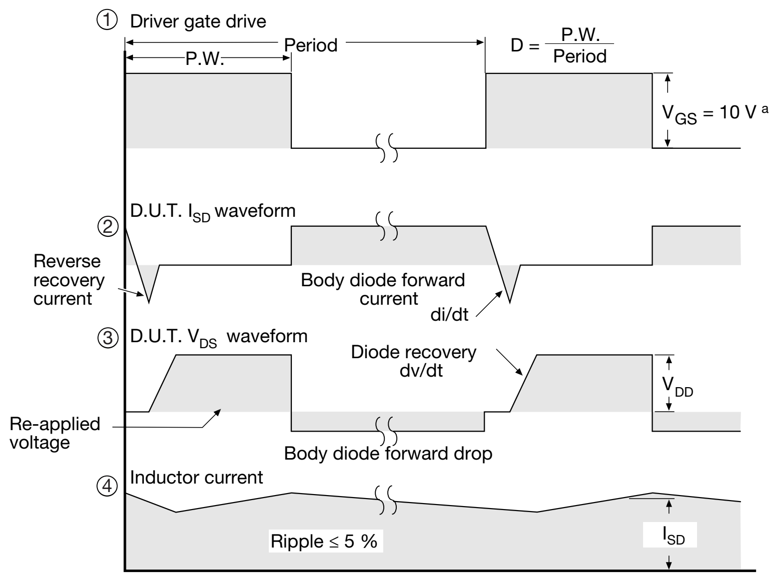


Fig. 19 - Gate Charge Test Circuit

Peak Diode Recovery dv/dt Test Circuit



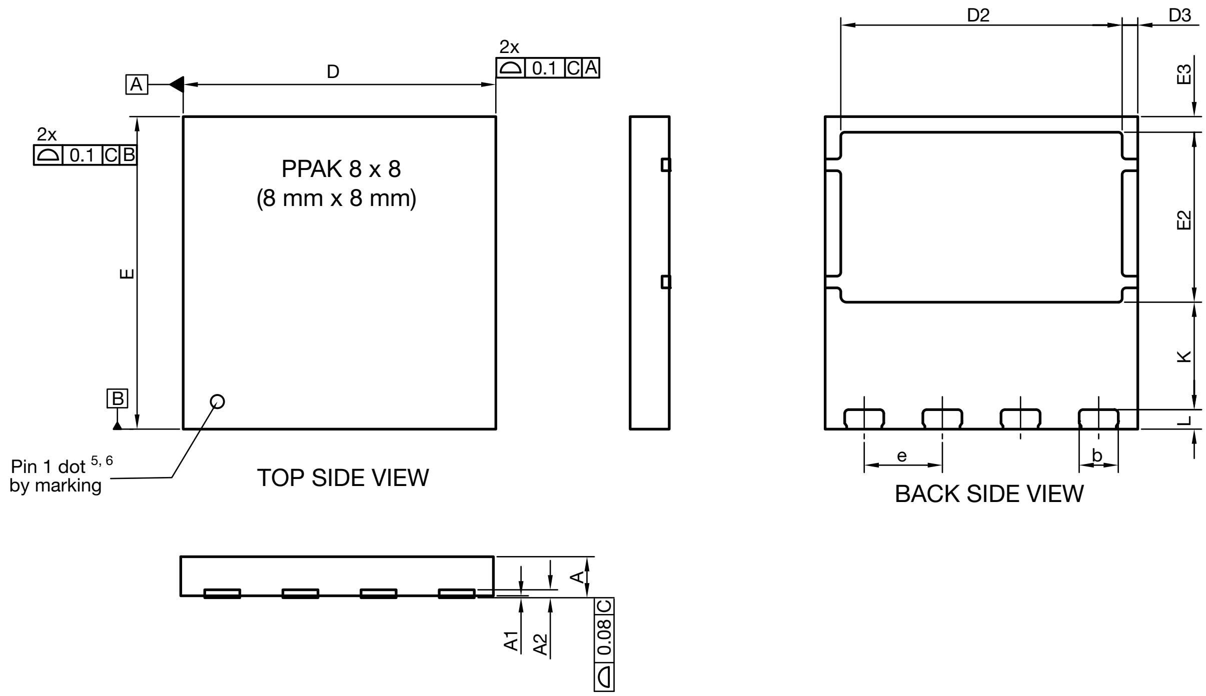


Note

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

Fig. 20 - For N-Channel

PowerPAK® 8 x 8 Case Outline



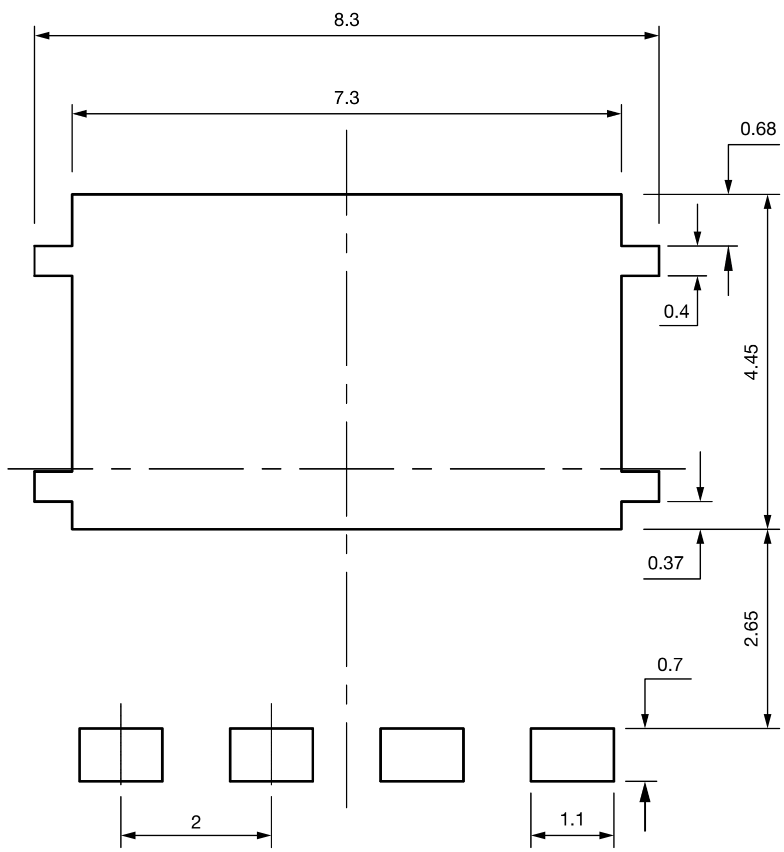
<table>
<tr><th rowspan="2">DIM.</th><th colspan="3">MILLIMETERS</th><th colspan="3">INCHES</th></tr>
<tr><th>MIN.</th><th>NOM.</th><th>MAX.</th><th>MIN.</th><th>NOM.</th><th>MAX.</th></tr>
<tr><td>A</td><td>0.95</td><td>1.00</td><td>1.05</td><td>0.037</td><td>0.039</td><td>0.041</td></tr>
<tr><td>A1</td><td>0.00</td><td>-</td><td>0.05</td><td>0.000</td><td>-</td><td>0.002</td></tr>
<tr><td>A2</td><td colspan="3">020 ref.</td><td colspan="3">0.008 ref.</td></tr>
<tr><td>b</td><td>0.95</td><td>1.00</td><td>1.05</td><td>0.037</td><td>0.039</td><td>0.041</td></tr>
<tr><td>D</td><td>7.90</td><td>8.00</td><td>8.10</td><td>0.311</td><td>0.315</td><td>0.319</td></tr>
<tr><td>D2</td><td>7.10</td><td>7.20</td><td>7.30</td><td>0.280</td><td>0.283</td><td>0.287</td></tr>
<tr><td>D3</td><td colspan="3">0.40 BSC</td><td colspan="3">0.016 BSC</td></tr>
<tr><td>e</td><td colspan="3">2.00 BSC</td><td colspan="3">0.079 BSC</td></tr>
<tr><td>E</td><td>7.90</td><td>8.00</td><td>8.10</td><td>0.311</td><td>0.315</td><td>0.319</td></tr>
<tr><td>E2</td><td>4.30</td><td>4.35</td><td>4.40</td><td>0.169</td><td>0.171</td><td>0.173</td></tr>
<tr><td>E3</td><td colspan="3">0.40 BSC</td><td colspan="3">0.016 BSC</td></tr>
<tr><td>K</td><td colspan="3">2.75 BSC</td><td colspan="3">0.108 BSC</td></tr>
<tr><td>L</td><td>0.45</td><td>0.50</td><td>0.55</td><td>0.018</td><td>0.020</td><td>0.022</td></tr>
<tr><td>N (3)</td><td colspan="3">8</td><td colspan="3">8</td></tr>
</table>

Notes

(1) Use millimeters as the primary measurement
(2) Dimensioning and tolerances conform to ASME Y14.5 M - 1994
(3) N is the number of terminals
(4) The pin 1 identifier must be existed on the top surface of the package by using indentation mark or other feature of package body
(5) Exact shape and size of this feature is optional

ECN: E20-0518-Rev. B, 28-Sep-2020
DWG: 6041

Recommended Minimum PADs for PowerPAK® 8 mm x 8 mm



Dimensions in millimeters

For technical questions, contact: pmostechsupport@vishay.com

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