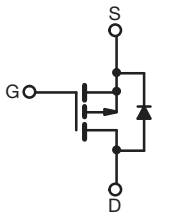
P-Channel 100 V (D-S) 175 °C MOSFET

FEATURES

- TrenchFET® Power MOSFET
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT



P-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	-100
$R_{DS(on)}$ max. (Ω) at V_{GS} = -10 V	0.043
$R_{DS(on)}$ max. (Ω) at V_{GS} = -4.5 V	0.048
Q_g typ. (nC)	54
I_D (A) [a]	-37
Configuration	Single

ORDERING INFORMATION	
Package	DPAK (TO-252)
Lead (Pb)-free and halogen-free	SUD50P10-43L-T1-GE3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	-100	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current (T_J = 175 °C) [b]	T_C = 25 °C	I_D	-37.1 [a]	A
	T_C = 125 °C		-31 [a]	
	T_A = 25 °C		-9.2 [b, c]	
	T_A = 125 °C		-7.7 [b, c]	
Pulsed drain current		I_{DM}	-40	
Continuous source current (diode conduction)	T_C = 25 °C	I_S	-50 [a]	
	T_A = 25 °C		-6.9 [b, c]	
Avalanche current	L = 0.1 mH	I_{AS}	-35	
Single pulse avalanche energy		E_{AS}	61	mJ
Maximum power dissipation	T_C = 25 °C	P_D	136	W
	T_C = 70 °C		95	
	T_A = 25 °C		8.3 [b, c]	
	T_A = 70 °C		5.8 [b, c]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	TYPICAL	MAXIMUM	UNIT
Junction-to-ambient [a]	t ≤ 10 s	R_{thJA}	15	18	°C/W
	Steady state		40	50	
Junction-to-case (drain)		R_{thJC}	0.85	1.1	

Note

a. Package limited
b. Surface mounted on 1" x 1" FR4 board
c. t = 10 s
d. Maximum under steady state conditions is 40 °C/W

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	VGS = 0 V, I_D = -250 µA	-100	-	-	V
VDS temperature coefficient	$\Delta V_{DS}/T_J$	I_D = -250 µA		-109	-	mV/°C
VGS(th) temperature coefficient	$\Delta V_{GS(th)}/T_J$		-	5.9	-	
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250 µA	-1	-	- 3	V
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = -100 V, V_{GS} = 0 V	-	-	-1	µA
		V_{DS} = -100 V, V_{GS} = 0 V, T_J = 55 °C	-	-	-10	
On-state drain current [a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = -10 V	-40	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = -10 V, I_D = -9.2 A	-	0.036	0.043	Ω
		V_{GS} = -4.5 V, I_D = -7.7 A	-	0.040	0.048	
Forward transconductance [a]	g_{fs}	V_{DS} = -15 V, I_D = -9.2 A	-	38	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{DS} = -50 V, V_{GS} = 0 V, f = 1 MHz	-	4600	-	pF
Output capacitance	C_{oss}		-	230	-	
Reverse transfer capacitance	C_{rss}		-	175	-	
Total gate charge	Q_g	V_{DS} = -50 V, V_{GS} = -10 V, I_D = -9.2 A	-	106	160	nC
		V_{DS} = -50 V, V_{GS} = -4.5 V, I_D = -9.2 A	-	54	81	
Gate-source charge	Q_{gs}		-	14	-	
Gate-drain charge	Q_{gd}		-	26	-	
Gate resistance	R_g	f = 1 MHz	-	4	-	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = -50 V, R_L = 6.5 Ω $I_D \cong$ -7.7 A, V_{GEN} = - 10 V, R_g = 1 Ω	-	15	25	ns
Rise time	t_r		-	20	30	
Turn-off delay time	$t_{d(off)}$		-	110	165	
Fall time	t_f		-	100	150	
Turn-on delay time	$t_{d(on)}$	V_{DD} = -50 V, R_L = 6.5 Ω $I_D \cong$ -7.7 A, V_{GEN} = -4.5 V, R_g = 1 Ω	-	42	65	ns
Rise time	t_r		-	160	240	
Turn-off delay time	$t_{d(off)}$		-	100	150	
Fall time	t_f		-	100	150	
Drain-source body diode characteristics						
Continuous source-drain diode current	I_S	T_C = 25 °C	-	-	-50	A
Pulse diode forward current [a]	I_{SM}		-	-	-40	
Body diode voltage	V_{SD}	I_S = - 7.7 A	-	-0.8	-1.2	V
Body diode reverse recovery time	t_{rr}	I_F = -7.7 A, dI/dt = 100 A/µs, TJ = 25 °C	-	60	90	ns
Body diode reverse recovery charge	Q_{rr}		-	150	225	nC
Reverse recovery fall time	t_a		-	46	-	ns
Reverse recovery rise time	t_b		-	14	-	

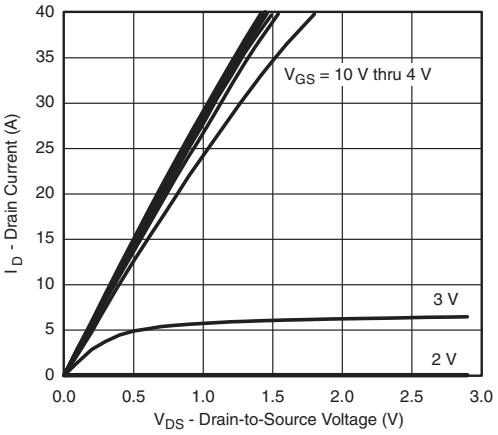
Notes

a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

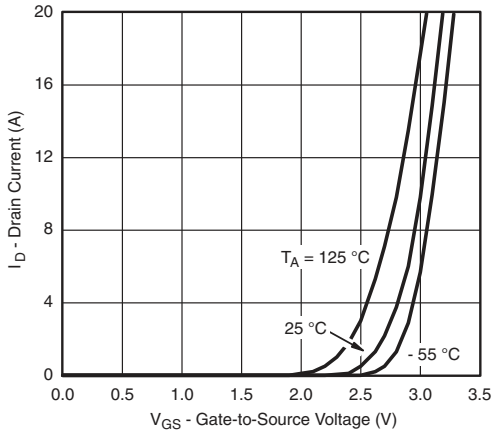
b. Guaranteed by design, not subject to production testing

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

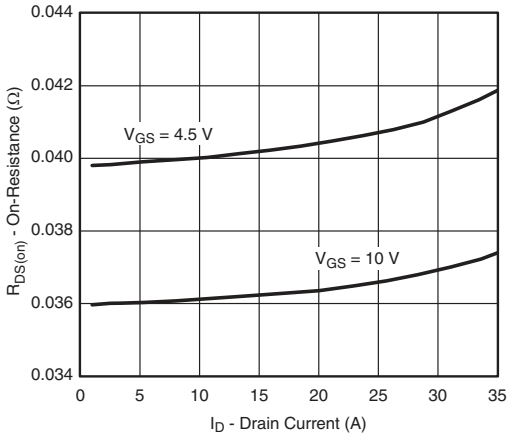
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



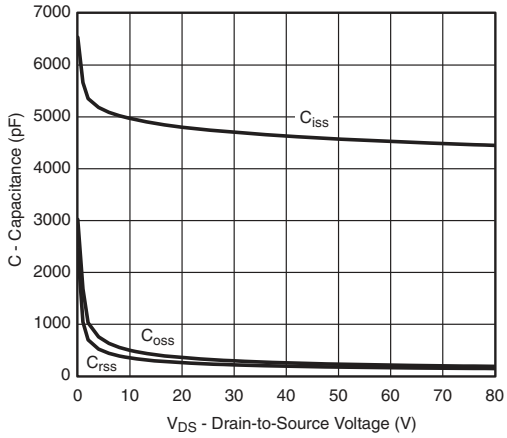
Output Characteristics



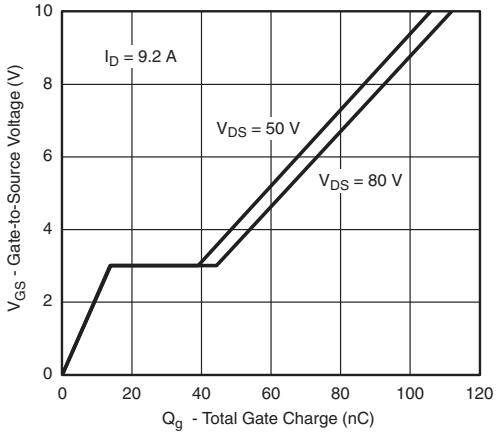
Transfer Characteristics



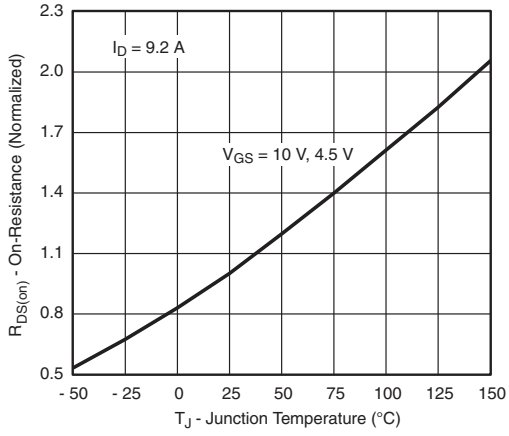
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

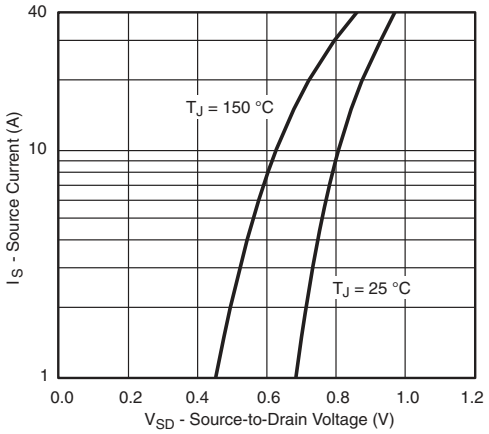


Gate Charge

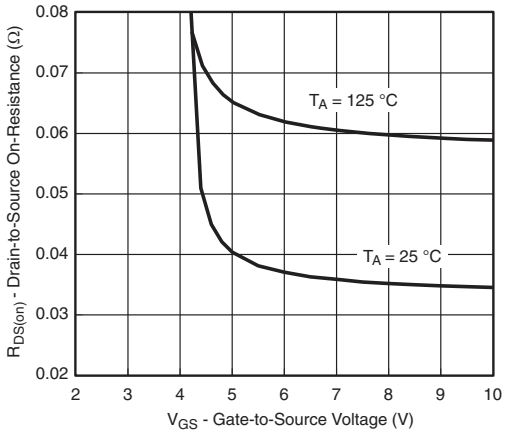


On-Resistance vs. Junction Temperature

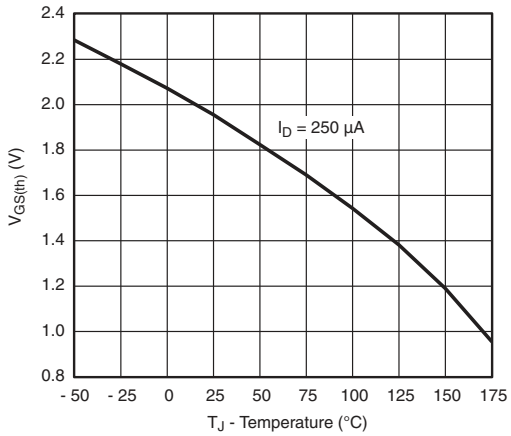
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



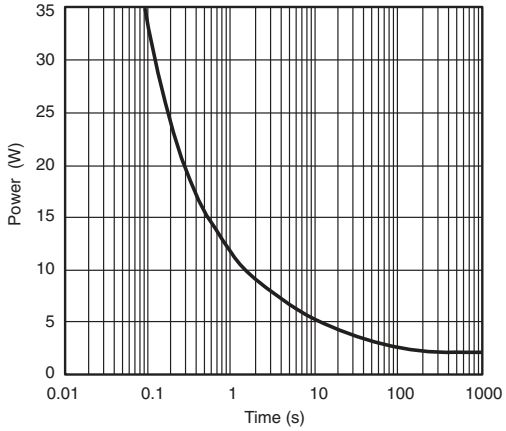
Source-Drain Diode Forward Voltage



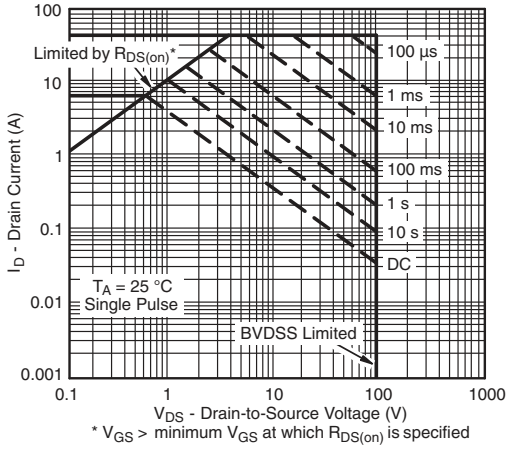
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

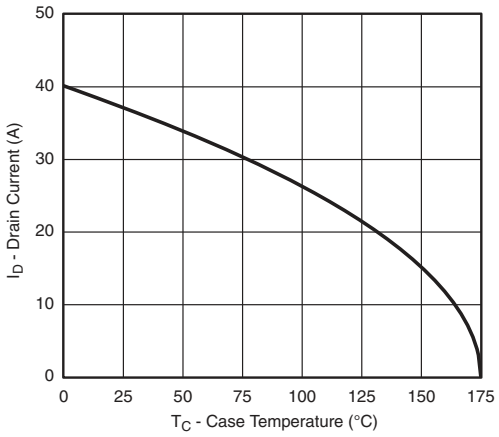


Single Pulse Power, Junction-to-Ambient

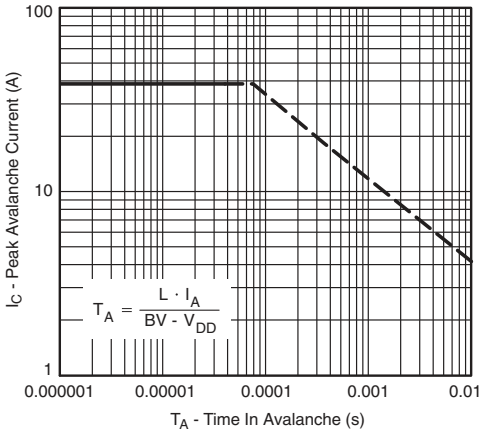


Safe Operating Area, Junction-to-Ambient

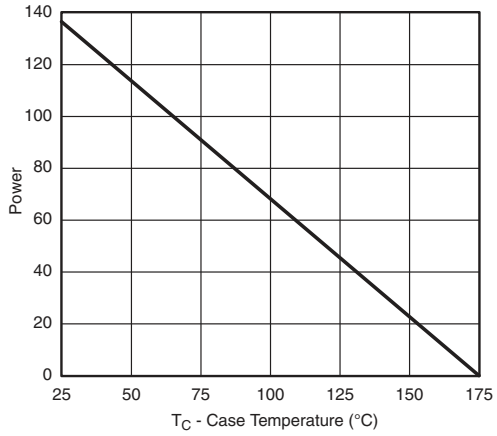
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating [a]



Single Pulse Avalanche Capability

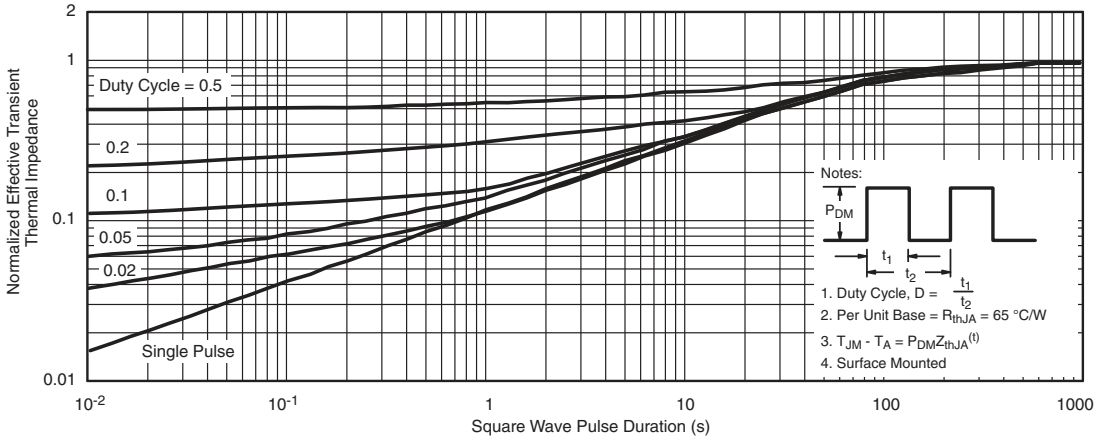


Single Pulse Power, Junction-to-Ambient

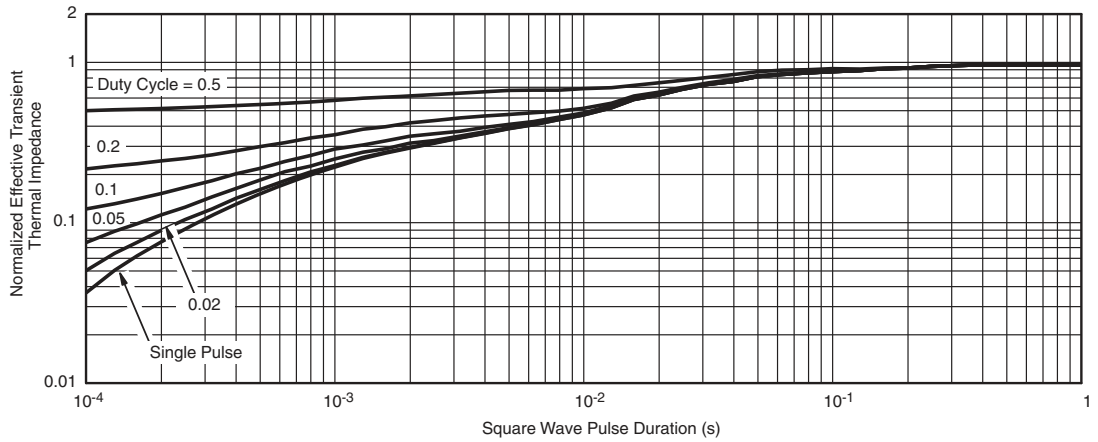
Note

a. The power dissipation P_D is based on T_J max. = 175 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Ambient

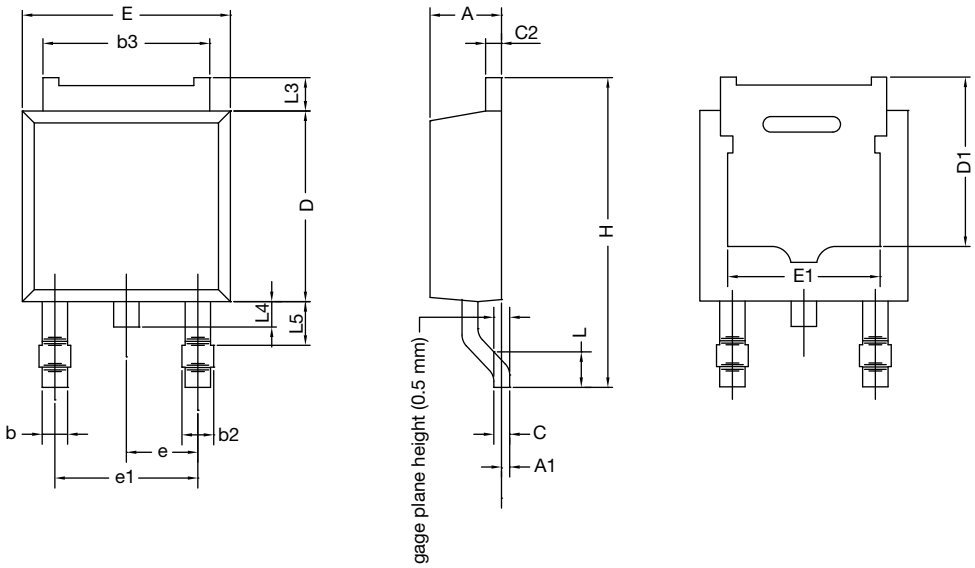


Normalized Thermal Transient Impedance, Junction-to-Case

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg?73444.

TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y

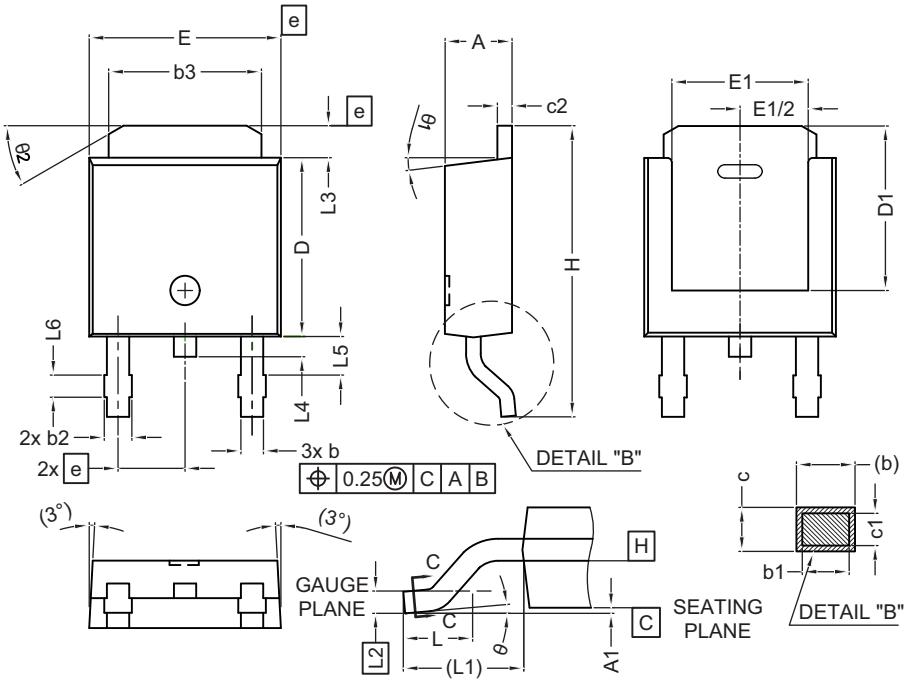


	MILLIMETERS	
DIM.	MIN.	MAX.
A	2.18	2.38
A1	-	0.127
b	0.64	0.88
b2	0.76	1.14
b3	4.95	5.46
C	0.46	0.61
C2	0.46	0.89
D	5.97	6.22
D1	4.10	-
E	6.35	6.73
E1	4.32	-
H	9.40	10.41
e	2.28 BSC	
e1	4.56 BSC	
L	1.40	1.78
L3	0.89	1.27
L4	-	1.02
L5	1.01	1.52

Note

- Dimension L3 is for reference only

VERSION 2: FACILITY CODE = N



	MILLIMETERS	
DIM.	MIN.	MAX.
A	2.18	2.39
A1	-	0.13
b	0.65	0.89
b1	0.64	0.79
b2	0.76	1.13
b3	4.95	5.46
c	0.46	0.61
c1	0.41	0.56
c2	0.46	0.60
D	5.97	6.22
D1	5.21	-
E	6.35	6.73
E1	4.32	-
e	2.29 BSC	
H	9.94	10.34

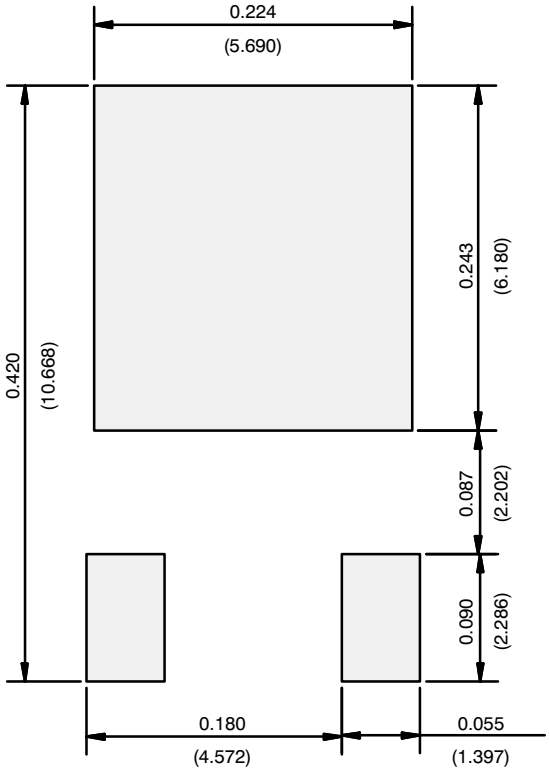
	MILLIMETERS	
DIM.	MIN.	MAX.
L	1.50	1.78
L1	2.74 ref.	
L2	0.51 BSC	
L3	0.89	1.27
L4	-	1.02
L5	1.14	1.49
L6	0.65	0.85
θ	0°	10°
θ1	0°	15°
θ2	25°	35°

Notes

- Dimensioning and tolerance confirm to ASME Y14.5M-1994
- All dimensions are in millimeters. Angles are in degrees
- Heat sink side flash is max. 0.8 mm
- Radius on terminal is optional

ECN: E22-0399-Rev. R, 03-Oct-2022
DWG: 5347

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

Return to Index

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