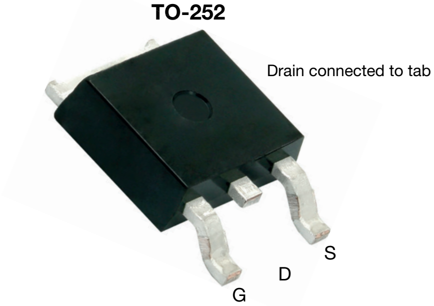
N-Channel 200 V (D-S) 175 °C MOSFET

TO-252



Top View

FEATURES

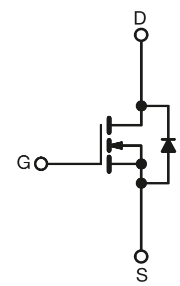
- ThunderFET® power MOSFET
- Low R_{DS} - Q_g figure-of-merit (FOM)
- Maximum 175 °C junction temperature
- 100 % R_g and UIS tested
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE

APPLICATIONS

- Synchronous rectification
- Power supplies
- DC/AC inverter
- DC/DC converter
- Solar micro inverter
- Motor drive switch



N-Channel MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	200
$R_{DS(on)}$ max. (Ω) at V_{GS} = 10 V	0.0375
$R_{DS(on)}$ max. (Ω) at V_{GS} = 7.5 V	0.0422
Q_g typ. (nC)	21
I_D (A)	35.1
Configuration	Single

ORDERING INFORMATION	
Package	TO-252
Lead (Pb)-free and halogen-free	SUD90330E-GE3

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

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	200	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current	T_C = 25 °C	I_D	35.8	A
	T_C = 125 °C		20.7	
Pulsed drain current (t = 100 μs)		I_{DM}	70	
Continuous source-drain diode current		I_S	12.5	
Single pulse avalanche current [a]	L = 0.1 mH	I_{AS}	33	
Single pulse avalanche energy [a]		E_{AS}	54.45	mJ
Maximum power dissipation	T_C = 25 °C	P_D	125 [b]	W
	T_C = 125 °C		41.7 [b]	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature) [c]			260	

THERMAL RESISTANCE RATINGS

PARAMETER		SYMBOL	MAXIMUM	UNIT
Maximum junction-to-ambient (PCB mount) [c]		R_{thJA}	40	°C/W
Maximum junction-to-case (drain)	Steady state	R_{thJC}	1.2	

Notes

a. Duty cycle ≤ 1 %

b. See SOA curve for voltage derating

c. When mounted on 1" square PCB (FR4 material)

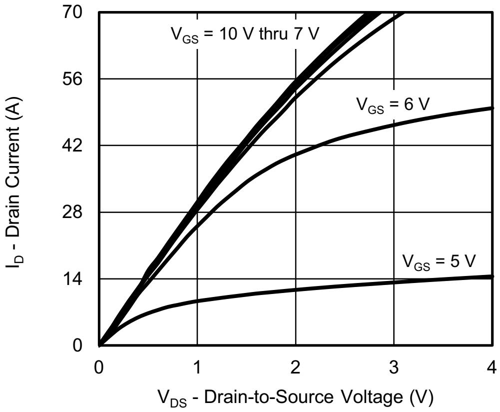
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	200	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2	-	4	V
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	250	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 200 V, V_{GS} = 0 V	-	-	1	μA
		V_{DS} = 200 V, V_{GS} = 0 V, T_J = 125 °C	-	-	150	
		V_{DS} = 200 V, V_{GS} = 0 V, T_J = 175 °C	-	-	5	mA
On-state drain current [a]	$I_{D(on)}$	V_{DS} ≥ 10 V, V_{GS} = 10 V	20	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 12.2 A	-	0.0312	0.0375	Ω
		V_{GS} = 7.5 V, I_D = 11.5 A	-	0.0337	0.0422	
Forward transconductance [a]	g_{fs}	V_{DS} = 15 V, I_D = 10 A	-	28	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{DS} = 100 V, V_{GS} = 0 V, f = 1 MHz	-	1172	-	pF
Output capacitance	C_{oss}		-	150	-	
Reverse transfer capacitance	C_{rss}		-	11	-	
Total gate charge	Q_g	V_{DS} = 100 V, V_{GS} =10 V, I_D = 12.2 A	-	21	32	nC
Gate-source charge	Q_{gs}		-	6	-	
Gate-drain charge	Q_{gd}		-	5.3	-	
Gate resistance	R_g	f = 1 MHz	0.76	3.8	7.6	Ω
Turn-on delay time	$t_{d(on)}$	V_{DD} = 100 V, R_L = 14.2 Ω, I_D ≅ 7 A, V_{GEN} = 10 V, R_g = 1 Ω	-	12	24	ns
Rise time	t_r		-	25	50	
Turn-off delay time	$t_{d(off)}$		-	30	50	
Fall time	t_f		-	22	44	
Drain-Source Body Diode Characteristics						
Pulse diode forward current (t = 100 μs)	I_{SM}		-	-	70	A
Body diode voltage	V_{SD}	I_F = 7 A, V_{GS} = 0 V	-	0.8	1.5	V
Body diode reverse recovery time	t_{rr}	I_F = 7 A, di/dt = 100 A/μs	-	111	170	ns
Body diode reverse recovery charge	Q_{rr}		-	0.51	1	μC
Reverse recovery fall time	t_a		-	94	-	ns
Reverse recovery rise time	t_b		-	17	-	
Body diode peak reverse recovery charge	$I_{RM(REC)}$		-	8.5	17	A

Notes

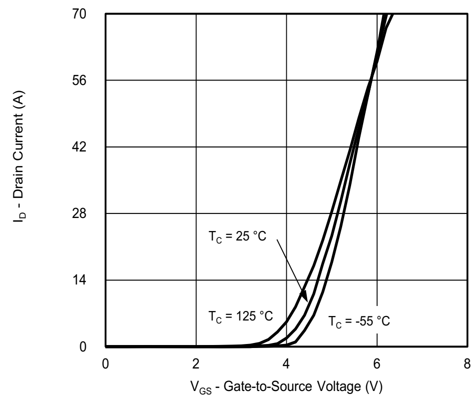
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing
c. Independent of operating temperature

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.

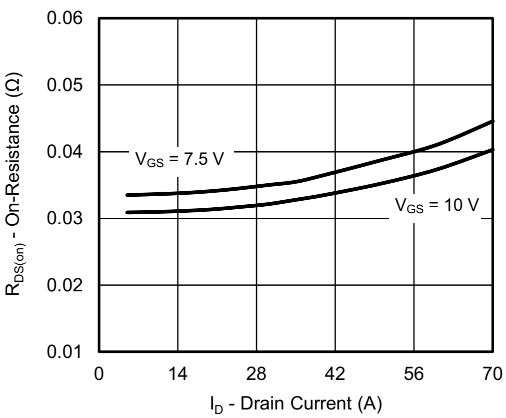
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



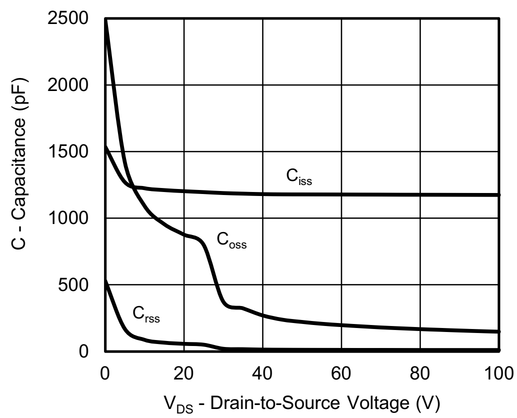
Output Characteristics



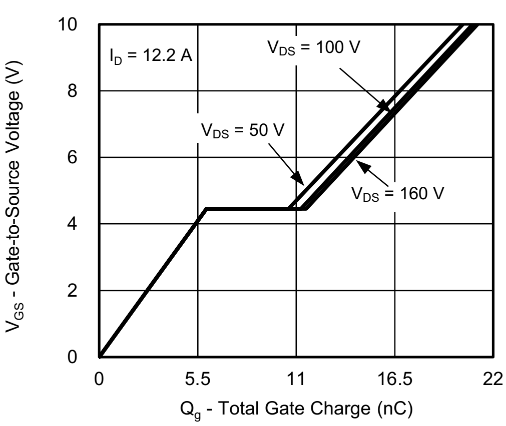
Transfer Characteristics



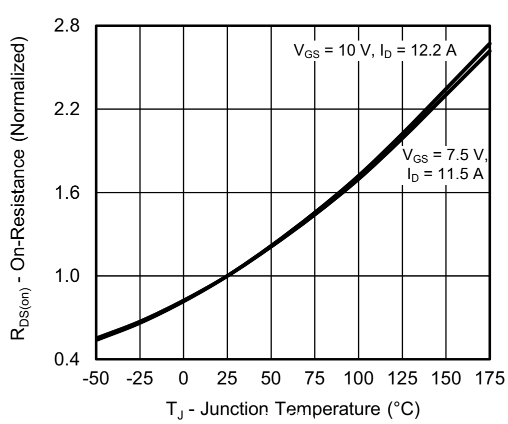
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

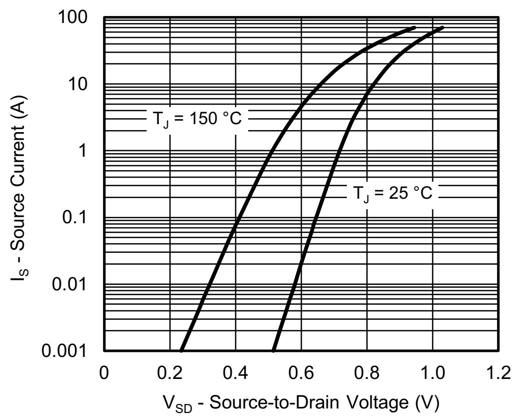


Gate Charge

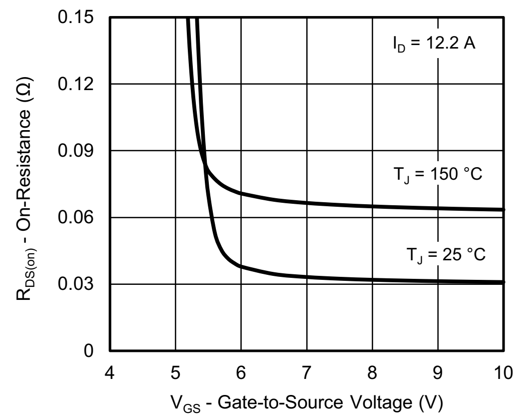


On-Resistance vs. Junction Temperature

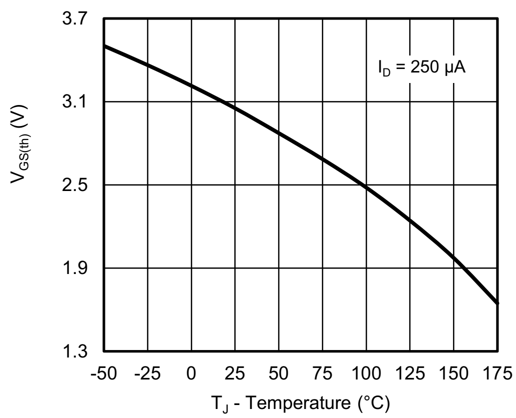
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



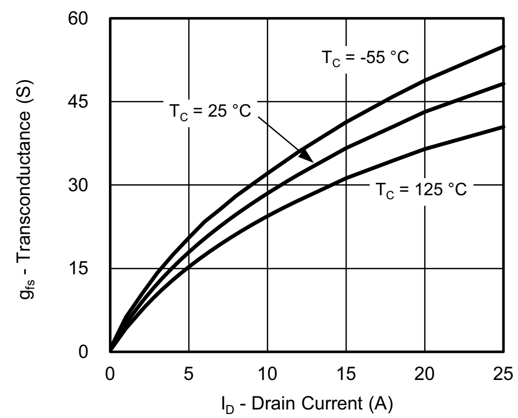
Source-Drain Diode Forward Voltage



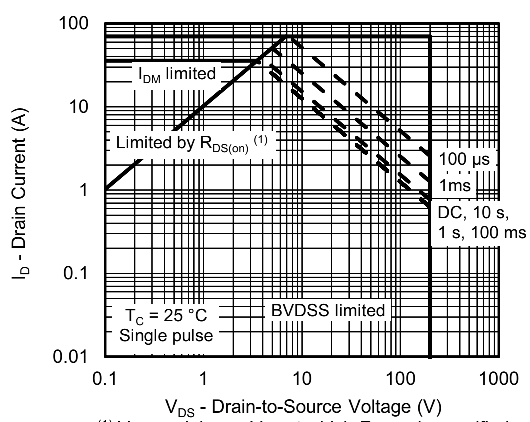
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



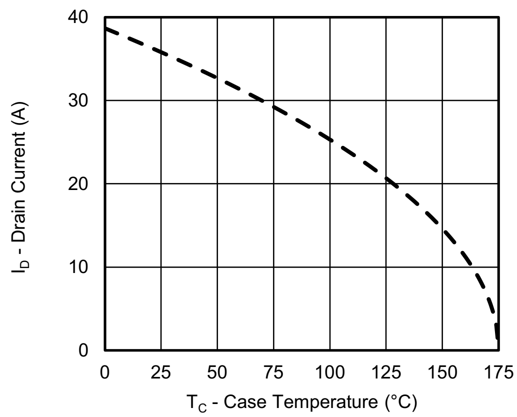
Transconductance



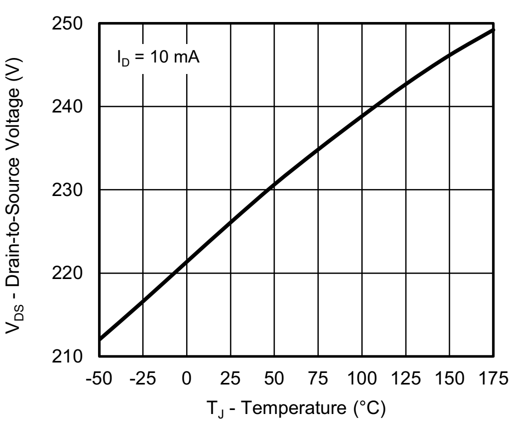
(1) V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area, Junction-to-Ambient

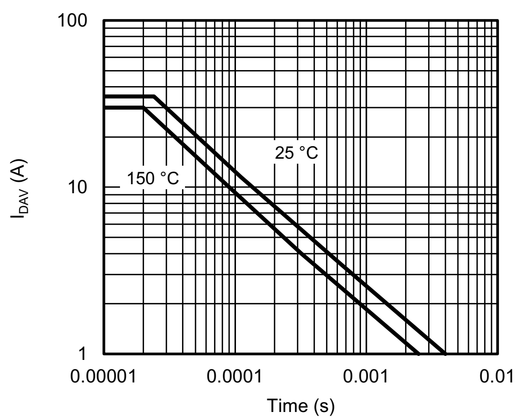
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Current Derating [a]



Drain Source Breakdown vs. Junction Temperature

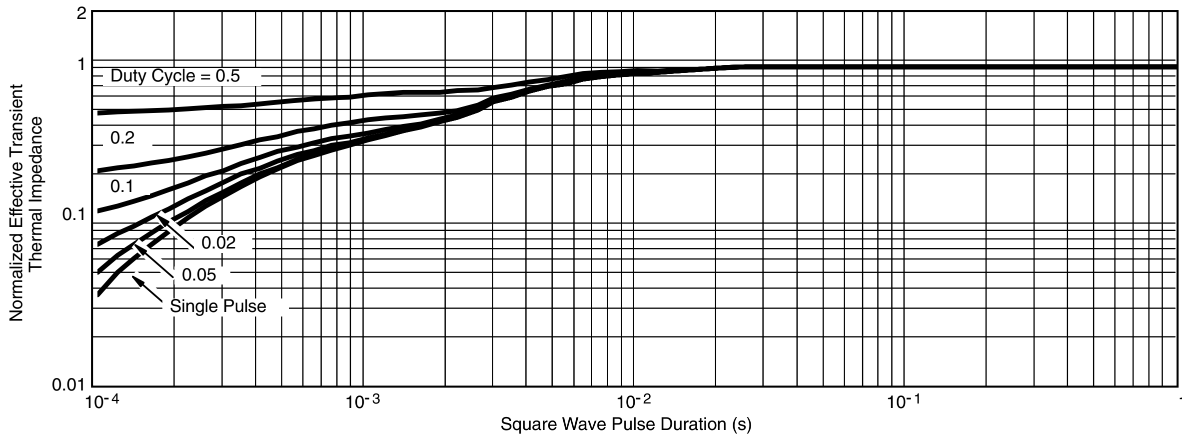


Avalanche vs. Time

Note

a. The power dissipation P_D is based on T_J max. = 25 °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-Case

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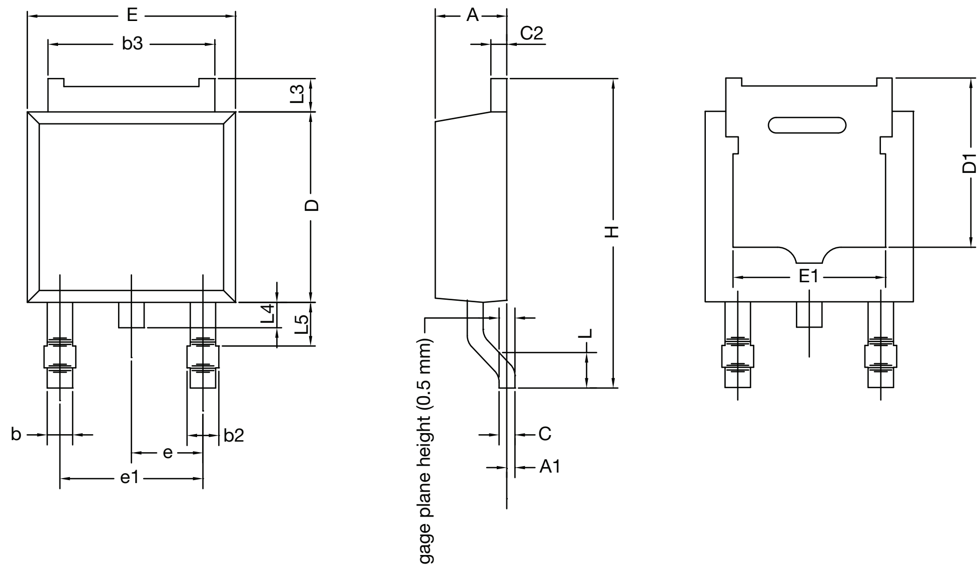
TO-252AA Case Outline

VERSION 1: FACILITY CODE = Y

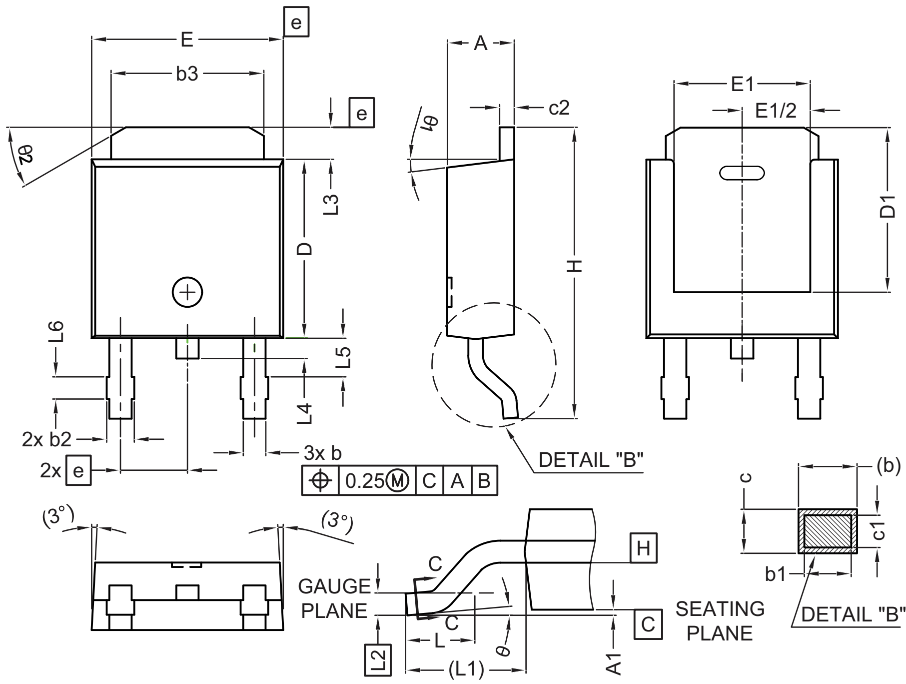


	MILLIMETERS	
DIM.	MIN.	MAX.
A	2.18	2.38
A1	-	0.127
b	0.64	0.88
b2	0.76	1.14
b3	4.95	5.46
C	0.46	0.61
C2	0.46	0.89
D	5.97	6.22
D1	4.10	-
E	6.35	6.73
E1	4.32	-
H	9.40	10.41
e	2.28 BSC	
e1	4.56 BSC	
L	1.40	1.78
L3	0.89	1.27
L4	-	1.02
L5	1.01	1.52

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

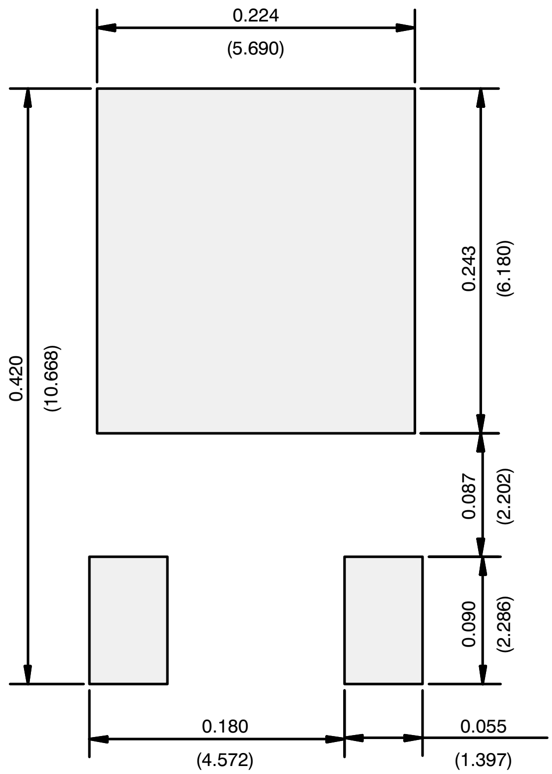
	MILLIMETERS	
DIM.	MIN.	MAX.
L	1.50	1.78
L1	2.74 ref.	
L2	0.51 BSC	
L3	0.89	1.27
L4	-	1.02
L5	1.14	1.49
L6	0.65	0.85
θ	0°	10°
θ1	0°	15°
θ2	25°	35°

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)

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