

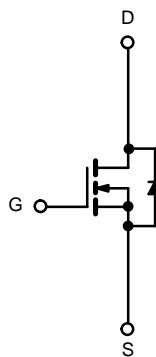
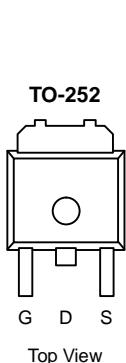
P45N02LDG-VB Datasheet

N-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^{a, e}	Q_g (Typ)
30	0.007 at $V_{GS} = 10$ V	70	25 nC
	0.009 at $V_{GS} = 4.5$ V	60	

FEATURES

- TrenchFET® Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2011/65/EU

RoHS
COMPLIANT

APPLICATIONS

- OR-ing
- Server
- DC/DC

ABSOLUTE MAXIMUM RATINGS ($T_A = 25$ °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	30		
Gate-Source Voltage	V_{GS}	± 20	V	
Continuous Drain Current ($T_J = 175$ °C)	$T_C = 25$ °C	I_D	70	A
	$T_C = 70$ °C		50	
	$T_A = 25$ °C		21.8 ^{b, c}	
	$T_A = 70$ °C		18 ^{b, c}	
Pulsed Drain Current	I_{DM}	200		
Avalanche Current Pulse	I_{AS}	39		
Single Pulse Avalanche Energy	E_{AS}	94.8	mJ	
Continuous Source-Drain Diode Current	$T_C = 25$ °C	I_S	50 ^{a, e}	A
	$T_A = 25$ °C		3.13 ^{b, c}	
Maximum Power Dissipation	$T_C = 25$ °C	P_D	100 ^a	W
	$T_C = 70$ °C		75	
	$T_A = 25$ °C		3.25 ^{b, c}	
	$T_A = 70$ °C		2.33 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 175		°C

THERMAL RESISTANCE RATINGS				
Parameter	Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^{b, d}	R_{thJA}	32	40	°C/W
Maximum Junction-to-Case	R_{thJC}	0.5	0.6	

Notes:

- a. Based on $T_C = 25$ °C.
- b. Surface mounted on 1" x 1" FR4 board.
- c. t = 10 sec.
- d. Maximum under steady state conditions is 90 °C/W.
- e. Calculated based on maximum junction temperature. Package limitation current is 90 A.

SPECIFICATIONS ($T_J = 25^\circ\text{C}$, unless otherwise noted)

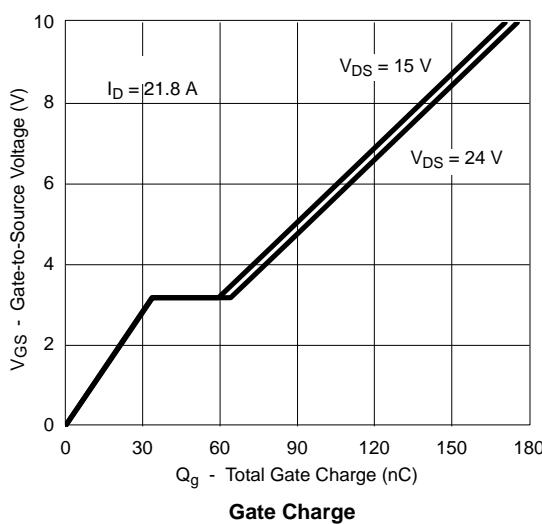
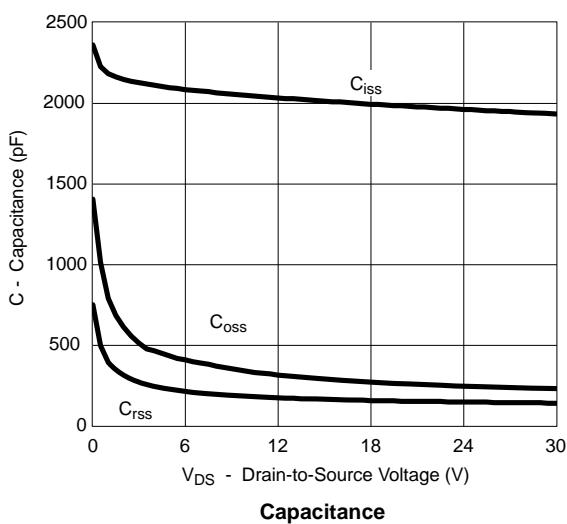
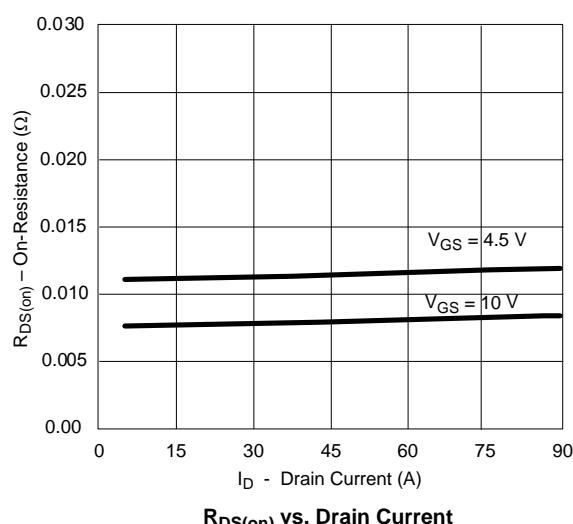
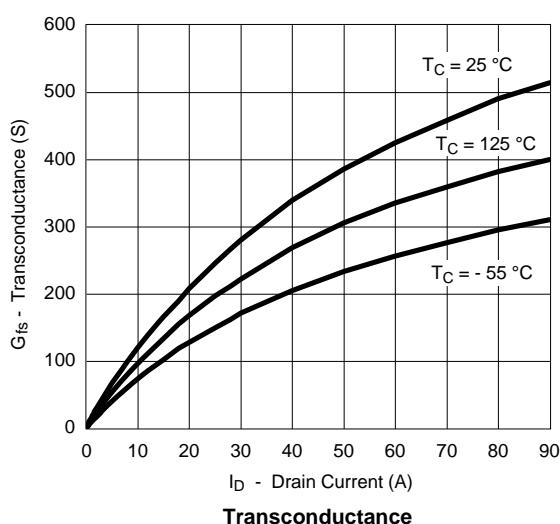
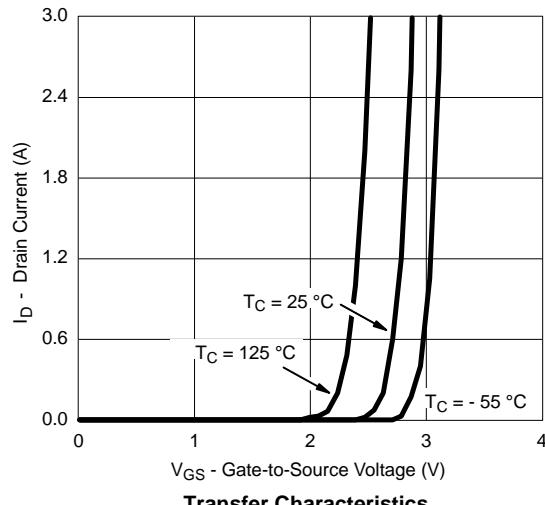
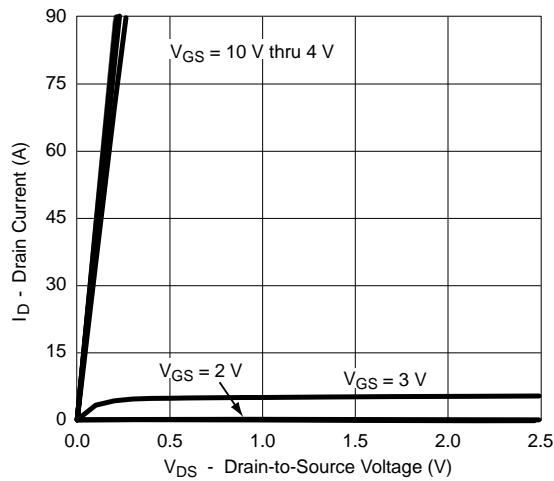
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = 250 \mu\text{A}$		35		mV/°C
$V_{GS(\text{th})}$ Temperature Coefficient	$\Delta V_{GS(\text{th})}/T_J$			- 7.5		
Gate-Source Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$, $I_D = 250 \mu\text{A}$	1.5		2.0	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0 \text{ V}$, $V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30 \text{ V}$, $V_{GS} = 0 \text{ V}$		1		μA
		$V_{DS} = 30 \text{ V}$, $V_{GS} = 0 \text{ V}$, $T_J = 55^\circ\text{C}$			10	
On-State Drain Current ^a	$I_{D(\text{on})}$	$V_{DS} \geq 5 \text{ V}$, $V_{GS} = 10 \text{ V}$	90			A
Drain-Source On-State Resistance ^a	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$, $I_D = 21.8 \text{ A}$		0.007		Ω
		$V_{GS} = 4.5 \text{ V}$, $I_D = 18 \text{ A}$		0.009		
Forward Transconductance ^a	g_{fs}	$V_{DS} = 15 \text{ V}$, $I_D = 21.8 \text{ A}$		160		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = 15 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1 \text{ MHz}$		2201		pF
Output Capacitance	C_{oss}			525		
Reverse Transfer Capacitance	C_{rss}			370		
Total Gate Charge	Q_g	$V_{DS} = 15 \text{ V}$, $V_{GS} = 10 \text{ V}$, $I_D = 21.8 \text{ A}$	35	45		nC
Gate-Source Charge	Q_{gs}	$V_{DS} = 15 \text{ V}$, $V_{GS} = 4.5 \text{ V}$, $I_D = 21.8 \text{ A}$	25	35		
Gate-Drain Charge	Q_{gd}		15			
Gate Resistance	R_g		20			
Turn-On Delay Time	$t_{d(\text{on})}$		$f = 1 \text{ MHz}$	1.4	2.1	Ω
Rise Time	t_r	$V_{DD} = 15 \text{ V}$, $R_L = 0.625 \Omega$ $I_D \approx 24 \text{ A}$, $V_{GEN} = 10 \text{ V}$, $R_g = 1 \Omega$	18	27		ns
Turn-Off Delay Time	$t_{d(\text{off})}$		11	17		
Fall Time	t_f		70	105		
Turn-On Delay Time	$t_{d(\text{on})}$		10	15		
Rise Time	t_r	$V_{DD} = 15 \text{ V}$, $R_L = 0.67 \Omega$ $I_D \approx 22.5 \text{ A}$, $V_{GEN} = 4.5 \text{ V}$, $R_g = 1 \Omega$	55	83		ns
Turn-Off Delay Time	$t_{d(\text{off})}$		180	270		
Fall Time	t_f		55	83		
			12	18		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25^\circ\text{C}$			120	A
Pulse Diode Forward Current ^a	I_{SM}				120	
Body Diode Voltage	V_{SD}	$I_S = 22 \text{ A}$		0.8	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 20 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$, $T_J = 25^\circ\text{C}$		52	78	ns
Body Diode Reverse Recovery Charge	Q_{rr}			70.2	105	nC
Reverse Recovery Fall Time	t_a			27		ns
Reverse Recovery Rise Time	t_b			25		

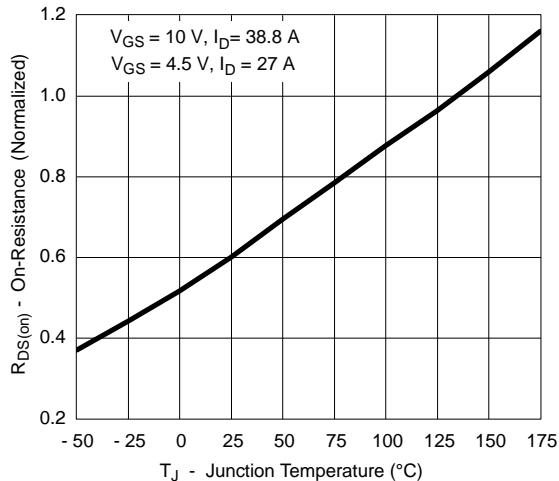
Notes:

a. Pulse test; pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2 \%$.

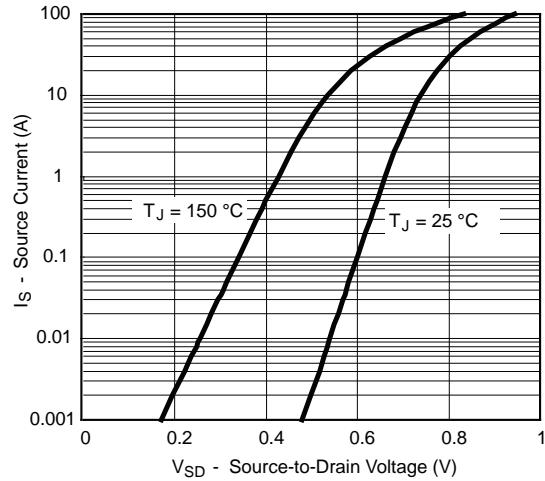
b. Guaranteed by design, not subject to production testing.

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.

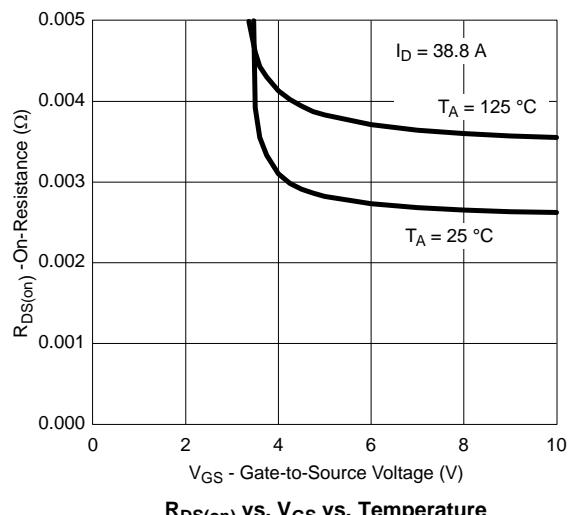
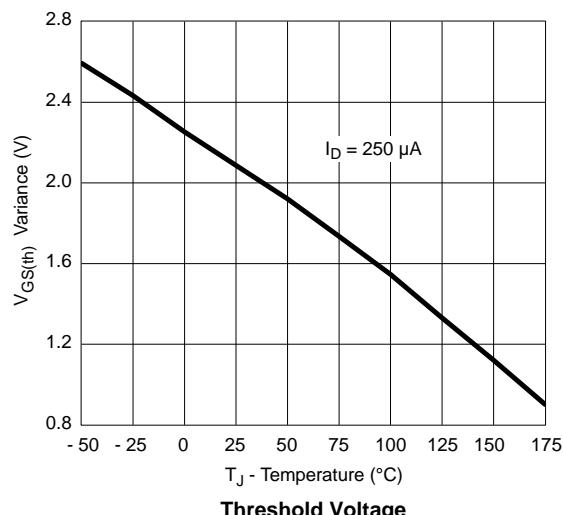
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


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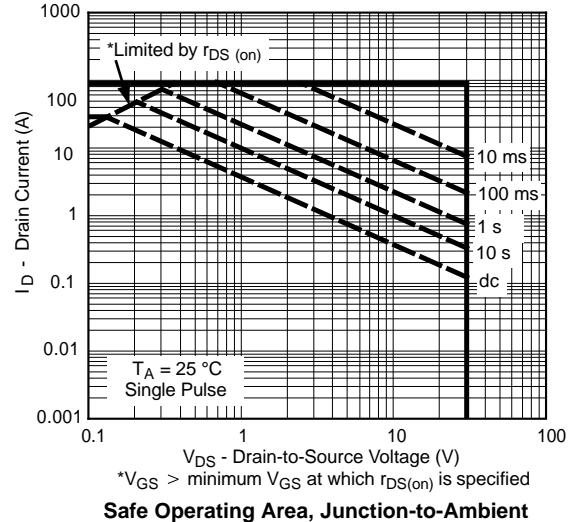
On-Resistance vs. Junction Temperature



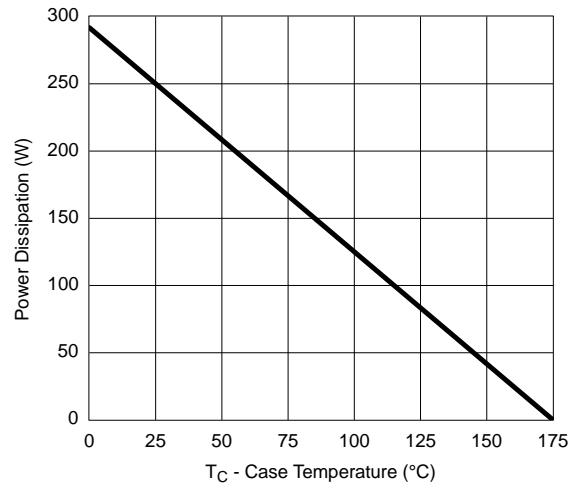
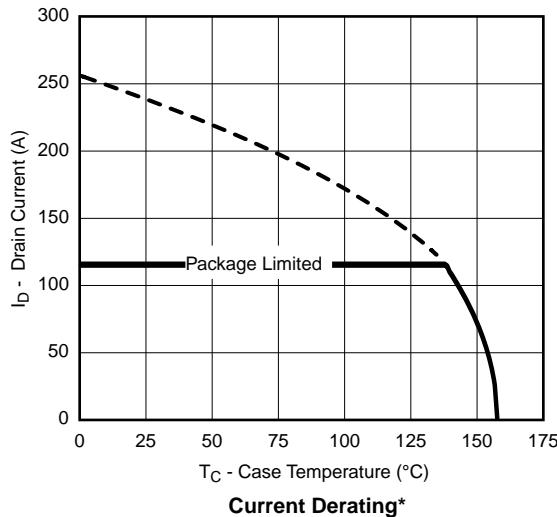
Forward Diode Voltage vs. Temperature

R_{DS(on)} vs. V_{GS} vs. Temperature

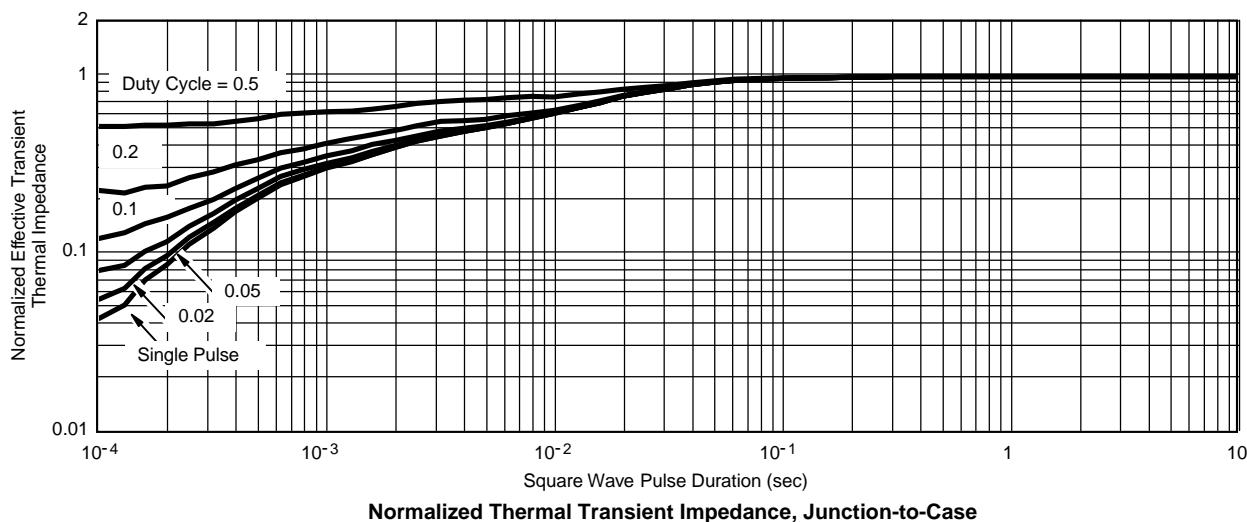
Threshold Voltage



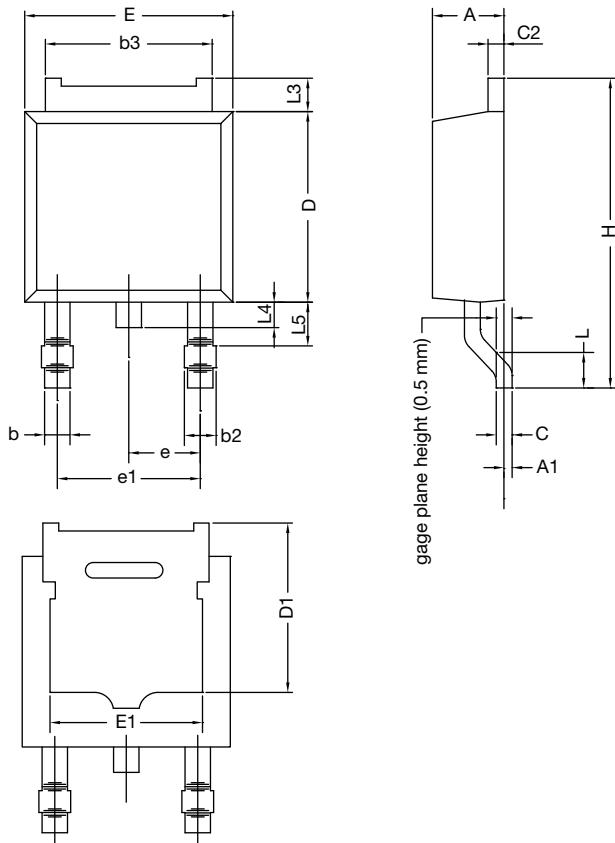
Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


*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.



TO-252AA CASE OUTLINE



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060

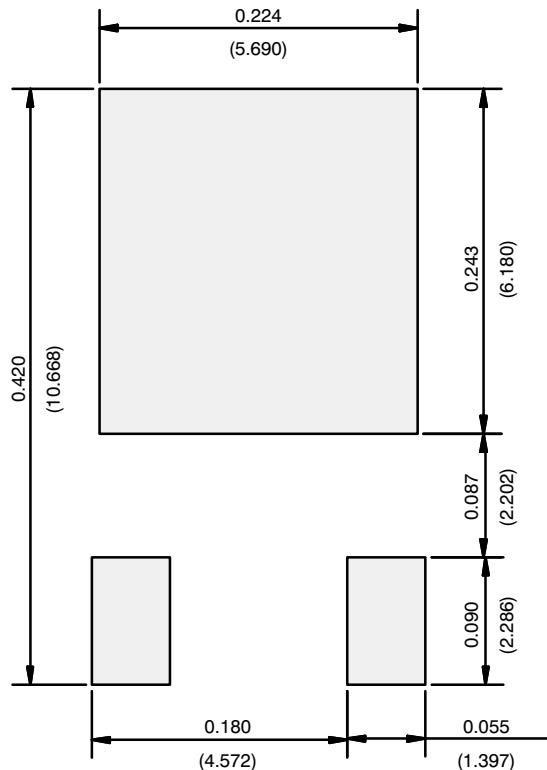
ECN: X12-0247-Rev. M, 24-Dec-12

DWG: 5347

Note

- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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