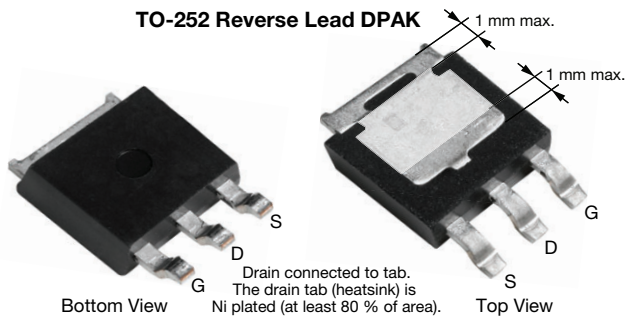


Automotive N-Channel 40 V (D-S) 175 °C MOSFET

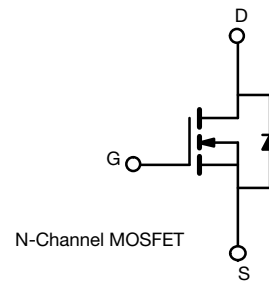
TO-252 Reverse Lead DPAK

FEATURES

- TrenchFET® power MOSFET
- Package with low thermal resistance
- Ni plated drain tab area (heatsink) for top side cooling
- 100 % R_g and UIS tested
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

 AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.00233
I_D (A)	100
Configuration	Single
Package	TO-252 reverse lead DPAK



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)			
PARAMETER	SYMBOL	LIMIT	UNIT
Drain-source voltage	V_{DS}	40	V
Gate-source voltage	V_{GS}	± 20	
Continuous drain current	I_D	$T_C = 25$ °C ^a	100
		$T_C = 125$ °C	87.5
Continuous source current (diode conduction)	I_S	97	A
Pulsed drain current ^b	I_{DM}	280	
Single pulse avalanche current	I_{AS}	46	
Single pulse avalanche energy	E_{AS}	105.8	mJ
Maximum power dissipation ^b	P_D	$T_C = 25$ °C	
		$T_C = 125$ °C	35
Operating junction and storage temperature range	T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS			
PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-ambient	R_{thJA}	50	°C/W
Junction-to-case (drain)	R_{thJC}	1.4	

Notes

- Package limited
- Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %
- When mounted on 1" square PCB (FR4 material)



SPECIFICATIONS (T _C = 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	40	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2.5	3.0	3.5	
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 40 V	-	-	1	μA
		V _{GS} = 0 V, V _{DS} = 40 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V, V _{DS} = 40 V, T _J = 175 °C	-	-	500	
On-state drain current ^a	I _{D(on)}	V _{GS} = 10 V, V _{DS} ≥ 5 V	50	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A	-	0.00190	0.00233	Ω
		V _{GS} = 10 V, I _D = 20 A, T _J = 125 °C	-	-	0.00390	
		V _{GS} = 10 V, I _D = 20 A, T _J = 175 °C	-	-	0.00470	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 20 A	-	84	-	S
Dynamic ^b						
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz	-	5405	8000	pF
Output capacitance	C _{oss}		-	1942	2700	
Reverse transfer capacitance	C _{rss}		-	175	250	
Total gate charge ^c	Q _g	V _{GS} = 10 V, V _{DS} = 20 V, I _D = 50 A	-	84	130	nC
Gate-source charge ^c	Q _{gs}		-	29.5	-	
Gate-drain charge ^c	Q _{gd}		-	19.5	-	
Gate resistance	R _g	f = 1 MHz	1	2	3	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 20 V, R _L = 0.4 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 1 Ω	-	17	30	ns
Rise time ^c	t _r		-	17	30	
Turn-off delay time ^c	t _{d(off)}		-	34	60	
Fall time ^c	t _f		-	18	35	
Source-Drain Diode Ratings and Characteristics ^b						
Pulsed current ^a	I _{SM}		-	-	280	A
Forward voltage	V _{SD}	I _F = 25 A, V _{GS} = 0 V	-	0.8	1.5	V
Body diode reverse recovery time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs	-	41	85	ns
Body diode reverse recovery charge	Q _{rr}		-	28	60	nC
Reverse recovery fall time	t _a		-	24	-	ns
Reverse recovery rise time	t _b		-	17	-	
Body diode peak reverse recovery current	I _{RM(REC)}			-	-1.36	-

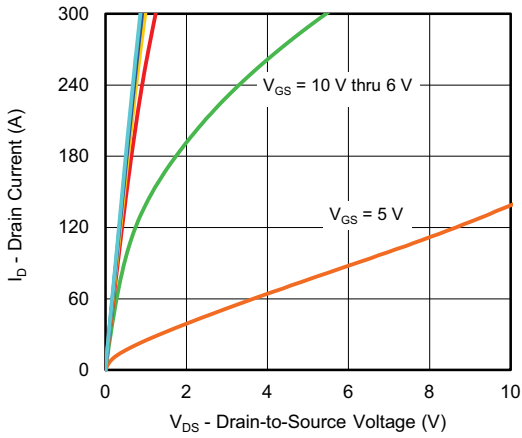
Notes

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

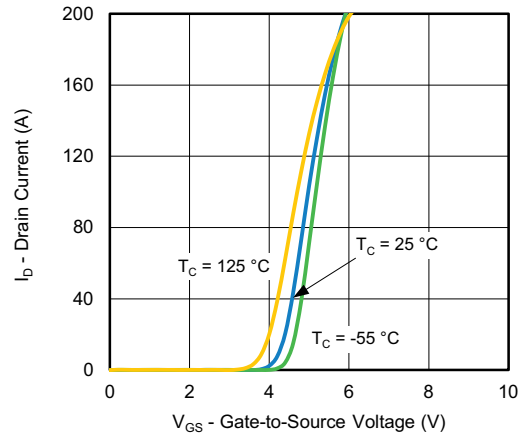
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



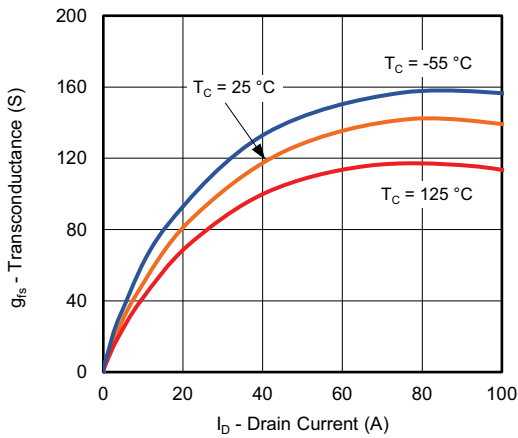
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



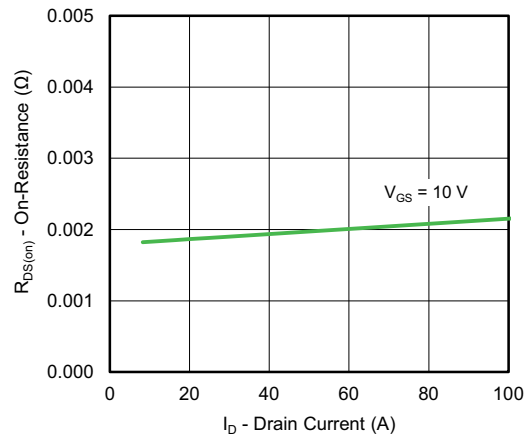
Output Characteristics



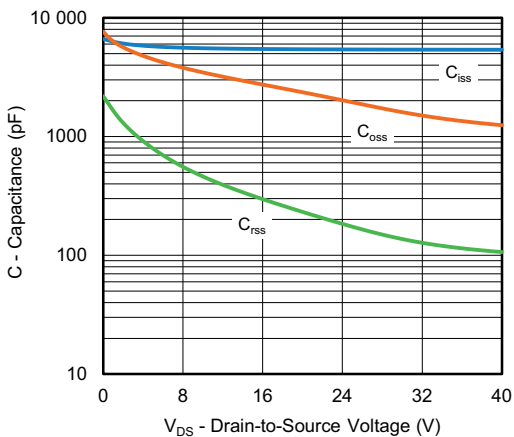
Transfer Characteristics



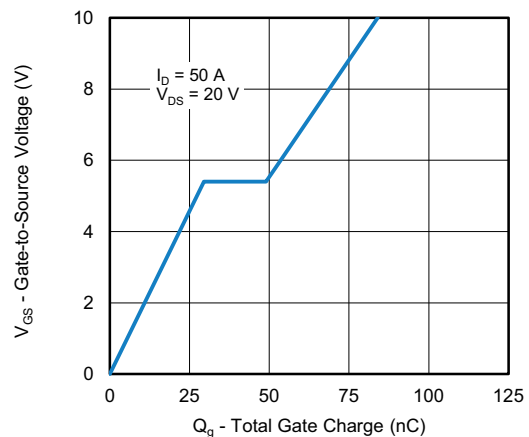
Transconductance



On-Resistance vs. Drain Current

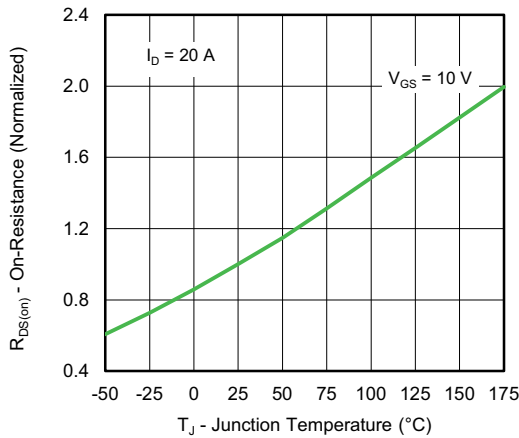


Capacitance

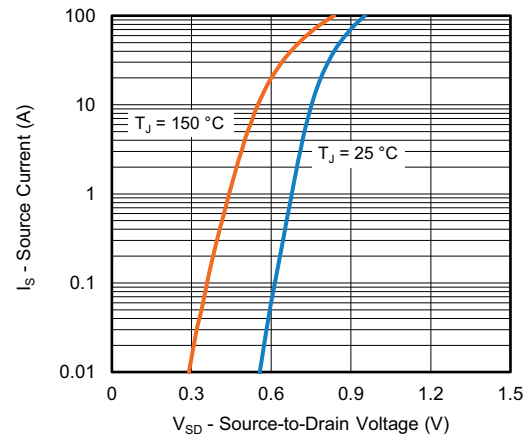


Gate Charge

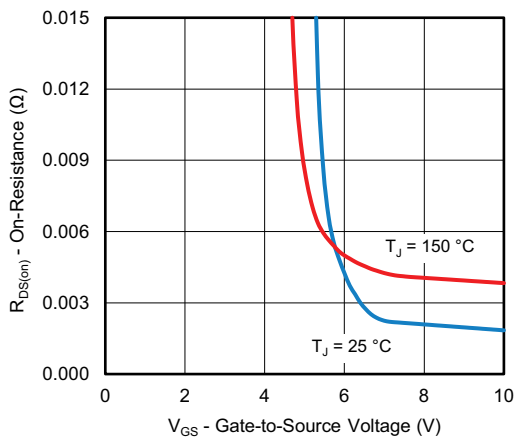
TYPICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)



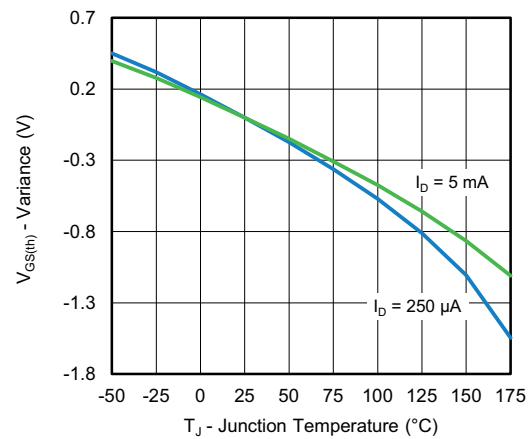
On-Resistance vs. Junction Temperature



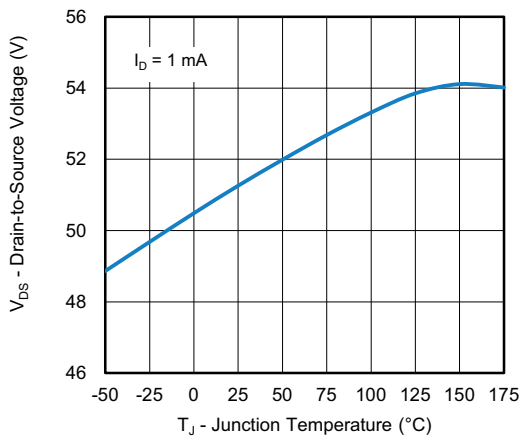
Source Drain Diode Forward Voltage



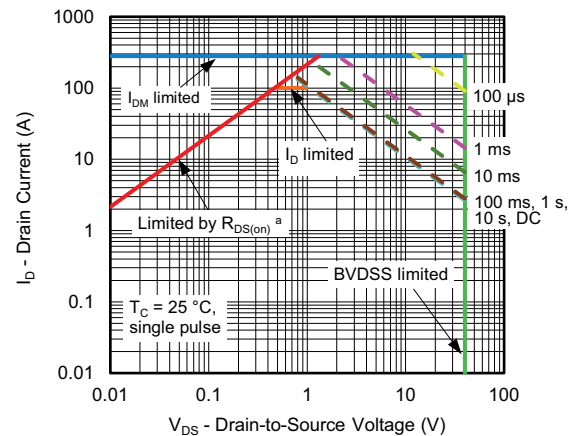
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



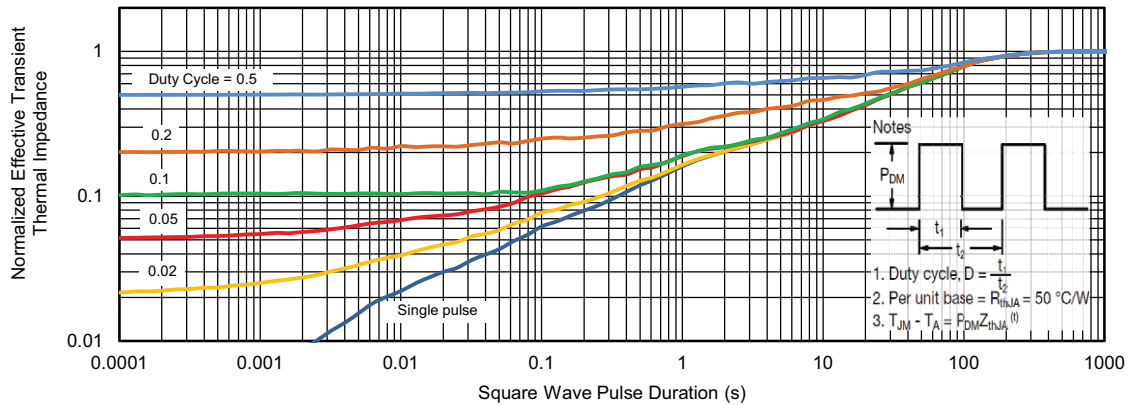
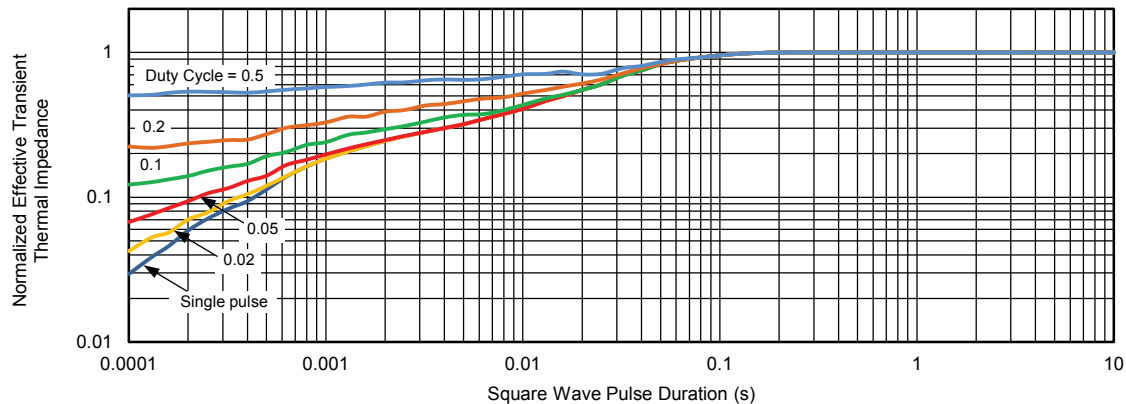
Drain Source Breakdown vs. Junction Temperature



Safe Operating Area

Note

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

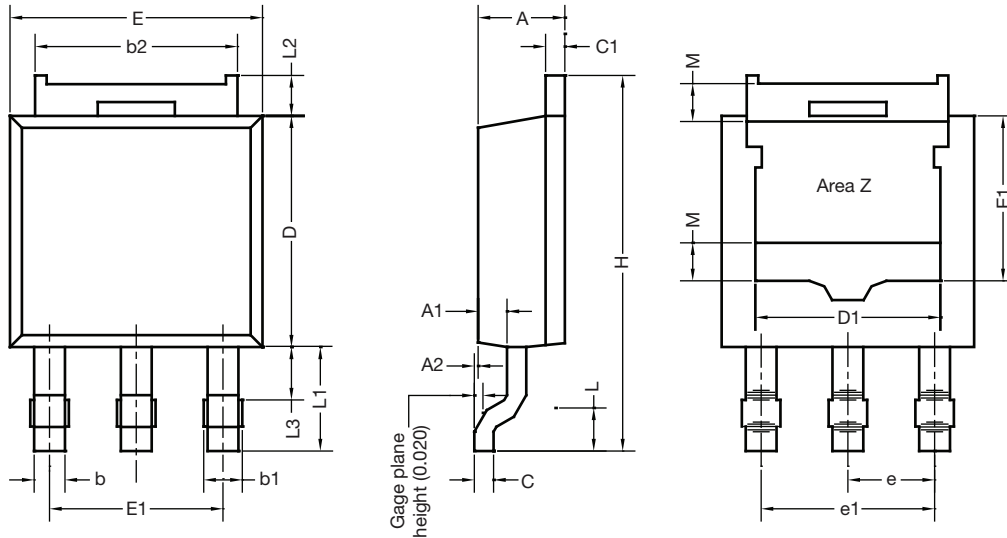
THERMAL RATINGS ($T_A = 25\text{ }^\circ\text{C}$, unless otherwise noted)

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case
Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^\circ\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^\circ\text{C}$)
 are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions

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TO-252 Reverse Lead Case Outline



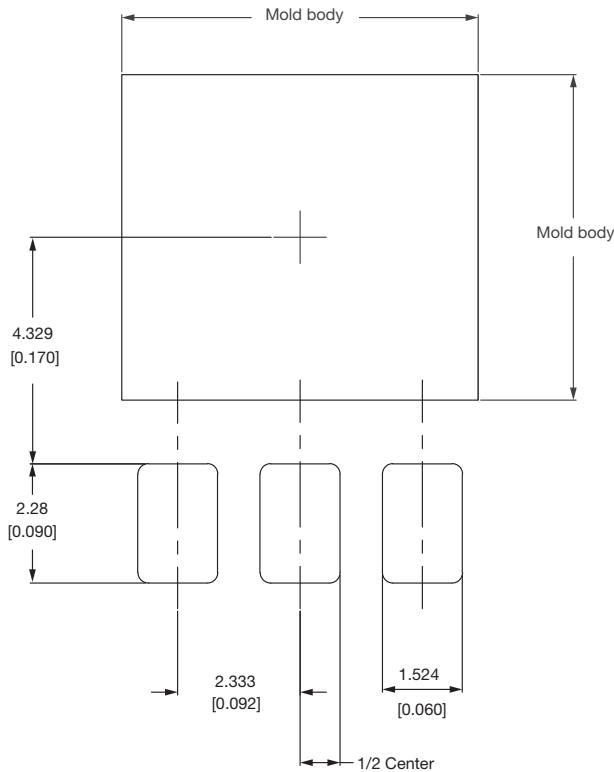
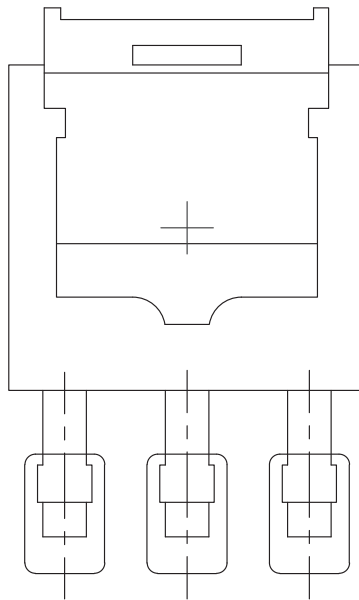
Notes

- Dimension L3 for reference only
- Area Z: unplated area more than 80 % heatsink area and for partial plating part only

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.23	2.33	0.088	0.092
A1	0.64	0.89	0.025	0.035
A2	0.03	0.18	0.001	0.007
b	0.71	0.88	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.44	0.206	0.214
C	0.46	0.58	0.018	0.023
C1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
D1	4.49	5.00	0.177	0.197
E	6.48	6.73	0.255	0.265
E1	4.32	-	0.170	-
e	2.28 BSC		0.090 BSC	
e1	4.57 BSC		0.180 BSC	
H	9.65	10.41	0.380	0.410
L	1.40	1.78	0.055	0.070
L1	2.74 BSC		0.108 BSC	
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.040	0.060
M	-	1.00 (reference only)	-	0.039 (reference only)

ECN: T16-0952-Rev. D, 16-Jan-17
 DWG: 5894

Recommended Land Pattern DPAK (TO-252) 3LR



Note

- Dimensions in mm (inches)

ECN: T22-0575-Rev. A, 12-Dec-2022
DWG: 3015



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