

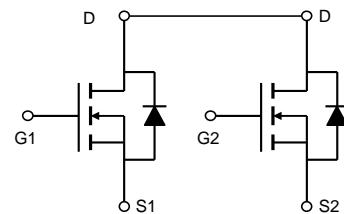
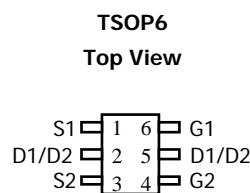
## WNMD2160-VB Datasheet

## Dual N-Channel MOSFET

PRODUCT SUMMARY		
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
20	0.024 at $V_{GS} = 4.5$ V	6.0
	0.028 at $V_{GS} = 2.5$ V	5.0

## FEATURES

- Halogen-free Option Available
- TrenchFET® Power MOSFETs
- 100 %  $R_g$  Tested
- Compliant to RoHS Directive 2002/95/EC



ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted					
Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		$V_{DS}$	20		V
Gate-Source Voltage		$V_{GS}$	$\pm 12$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>a</sup>		$I_D$	6.0	5.2	A
$T_A = 25$ °C			4.8	4.2	
Pulsed Drain Current		$I_{DM}$	30		
Continuous Source Current (Diode Conduction) <sup>a</sup>		$I_S$	1.5	1.0	
Maximum Power Dissipation <sup>a</sup>		$P_D$	1.5	1.0	W
$T_A = 70$ °C			0.96	0.64	
Operating Junction and Storage Temperature Range		$T_J, T_{stg}$	-55 to 150		°C

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 10$ s	$R_{thJA}$	72	83	°C/W
	Steady State		100	120	
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	55	70	

Notes:

a. Surface Mounted on FR4 board,  $t \leq 10$  s.

\* Pb containing terminations are not RoHS compliant, exemptions may apply.

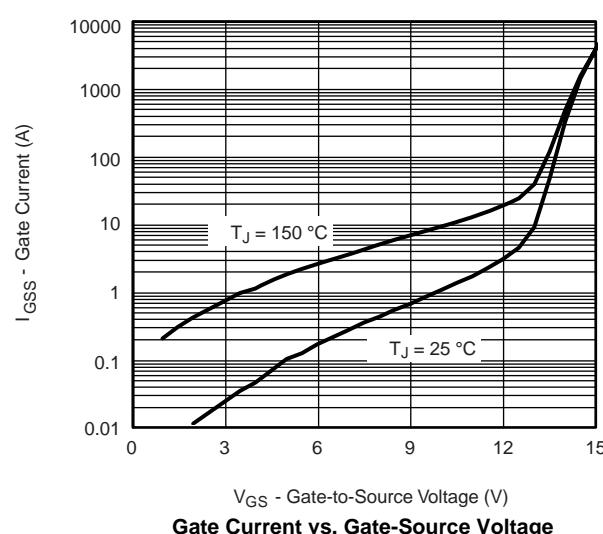
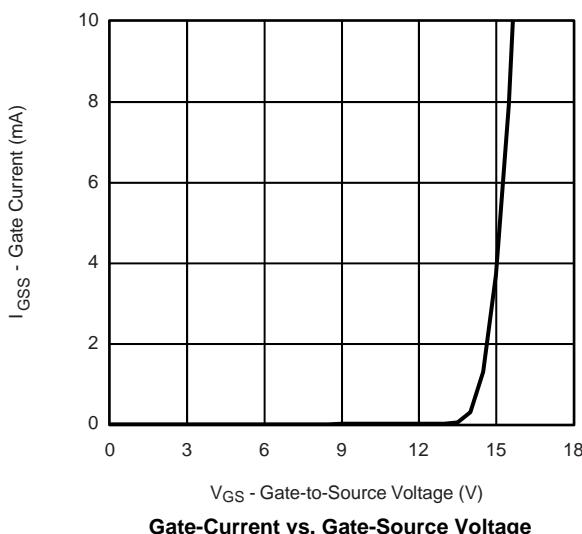
**SPECIFICATIONS**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

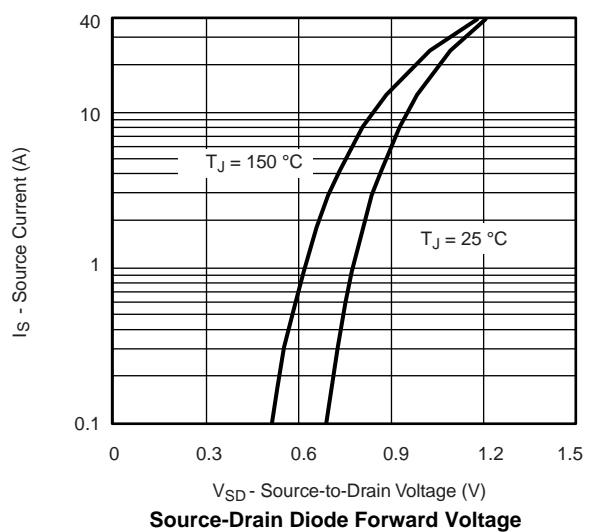
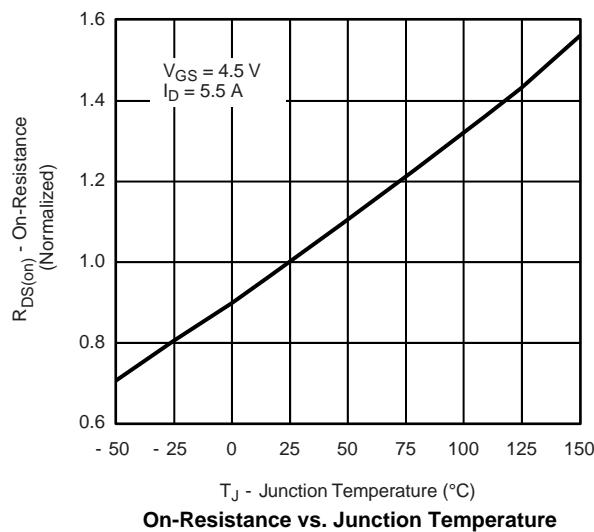
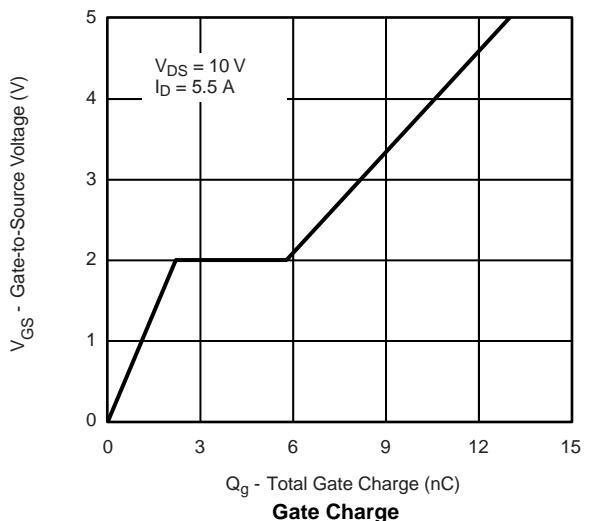
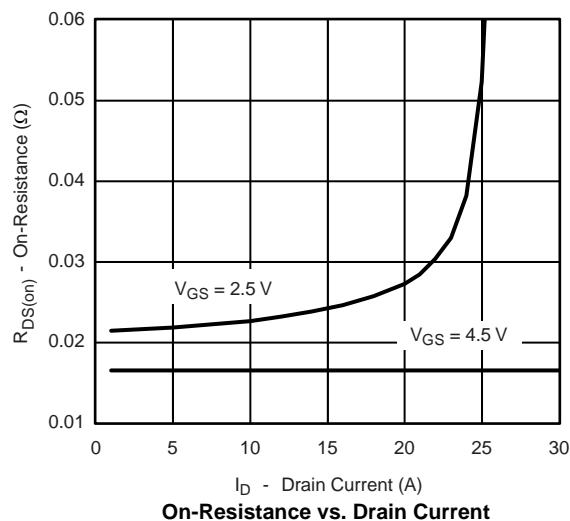
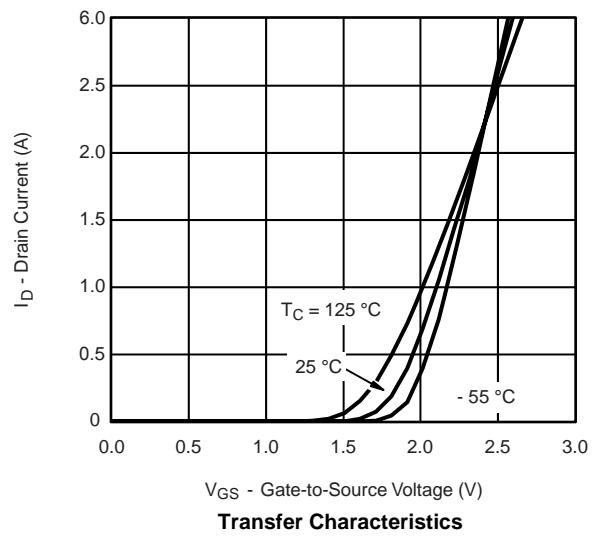
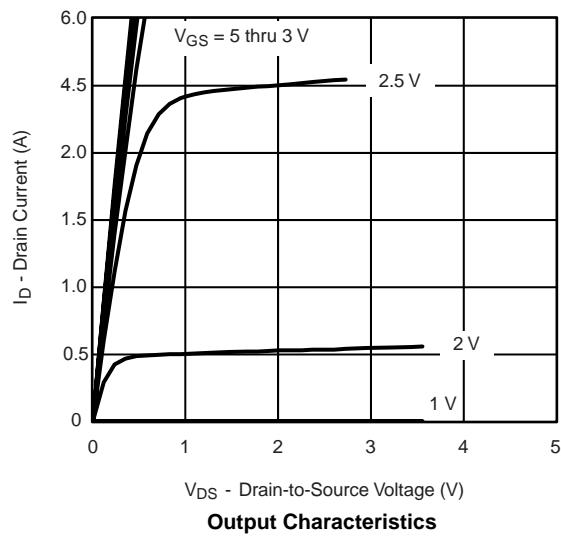
Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$	0.5		1.5	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}$ , $V_{GS} = \pm 4.5 \text{ V}$			$\pm 200$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20 \text{ V}$ , $V_{GS} = 0 \text{ V}$		1		$\mu\text{A}$
		$V_{DS} = 20 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 70^\circ\text{C}$		25		
On-State Drain Current <sup>b</sup>	$I_{D(\text{on})}$	$V_{DS} \leq 5 \text{ V}$ , $V_{GS} = 4.5 \text{ V}$	30			A
Drain-Source On-State Resistance <sup>b</sup>	$R_{DS(\text{on})}$	$V_{GS} = 4.5 \text{ V}$ , $I_D = 5.5 \text{ A}$		0.024		$\Omega$
		$V_{GS} = 2.5 \text{ V}$ , $I_D = 3.5 \text{ A}$		0.028		
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 10 \text{ V}$ , $I_D = 5.5 \text{ A}$		30		S
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_S = 1.5 \text{ A}$ , $V_{GS} = 0 \text{ V}$		0.71	1.2	V
<b>Dynamic<sup>a</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10 \text{ V}$ , $V_{GS} = 4.5 \text{ V}$ , $I_D = 5.5 \text{ A}$		12	18	nC
Gate-Source Charge	$Q_{gs}$			2.2		
Gate-Drain Charge	$Q_{gd}$			3.6		
Turn-On Delay Time	$t_{d(\text{on})}$	$V_{DD} = 10 \text{ V}$ , $R_L = 10 \Omega$ $I_D \geq 1 \text{ A}$ , $V_{GEN} = 4.5 \text{ V}$ , $R_G = 6 \Omega$		245	365	ns
Rise Time	$t_r$			330	495	
Turn-Off Delay Time	$t_{d(\text{off})}$			860	1300	
Fall Time	$t_f$			510	765	

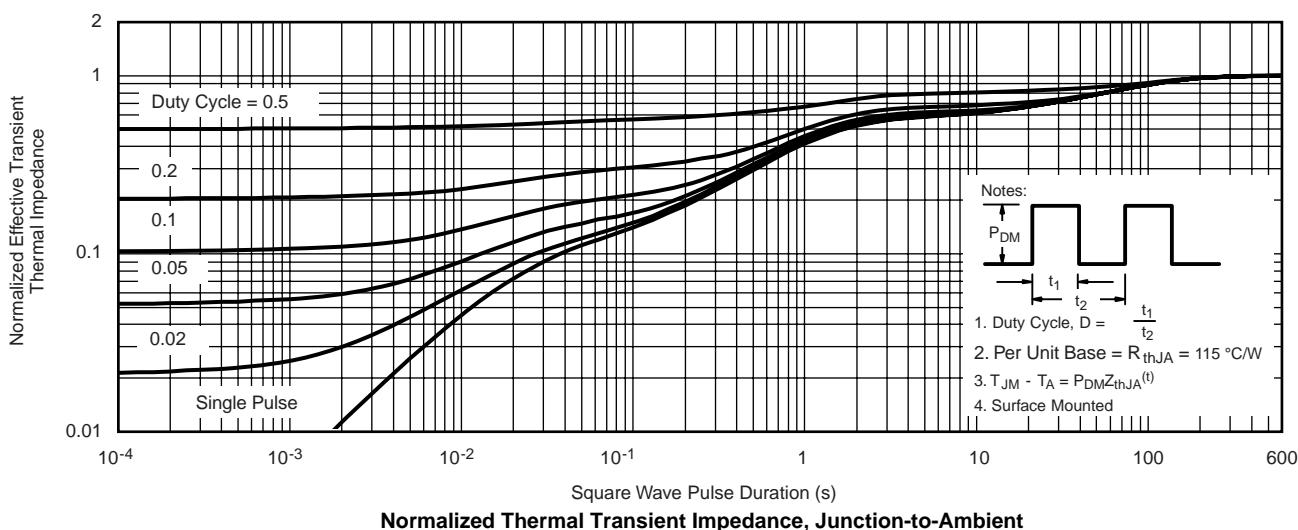
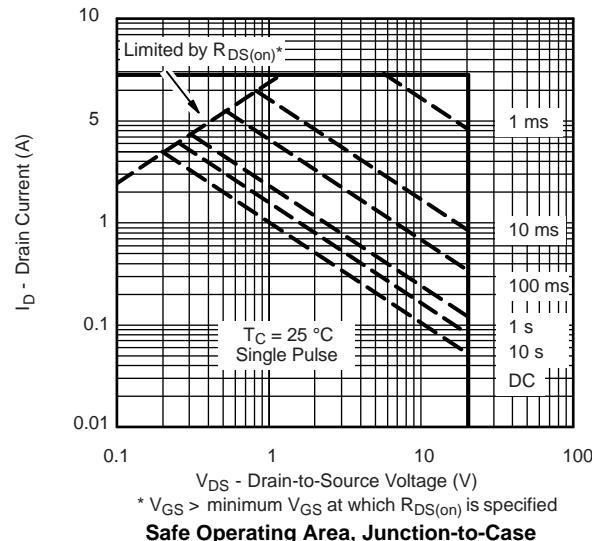
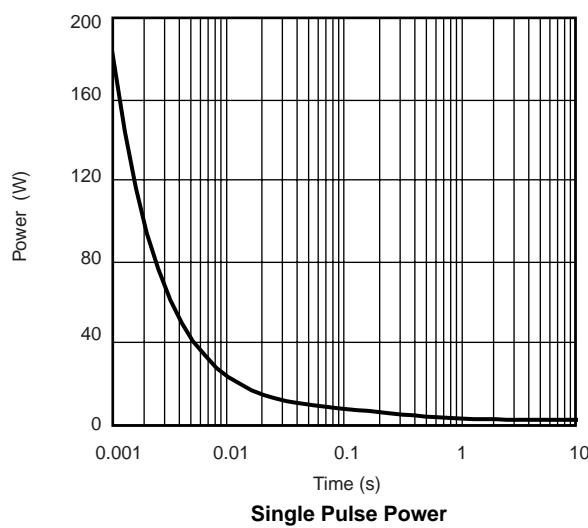
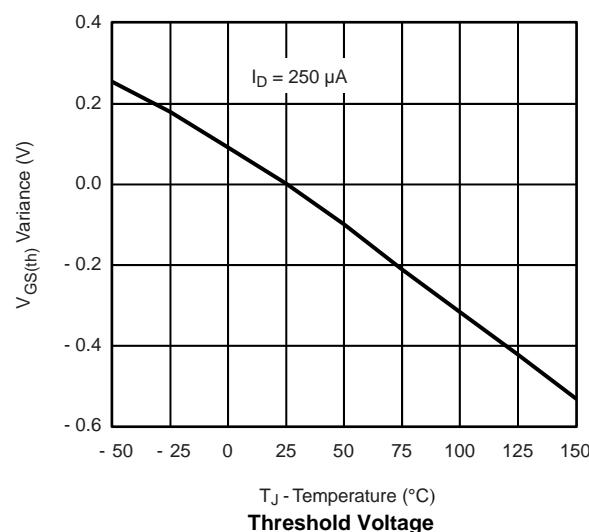
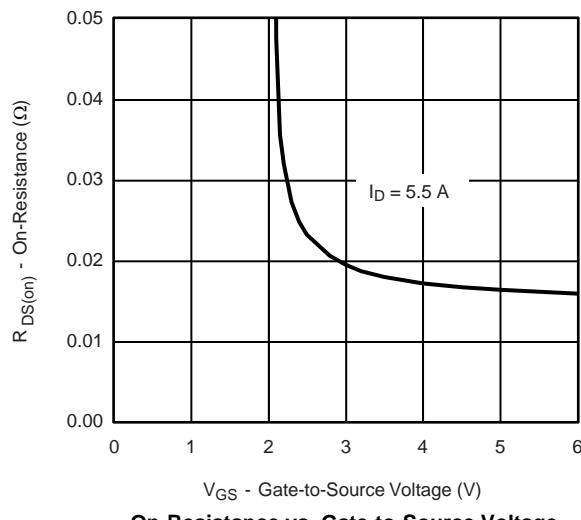
Notes:

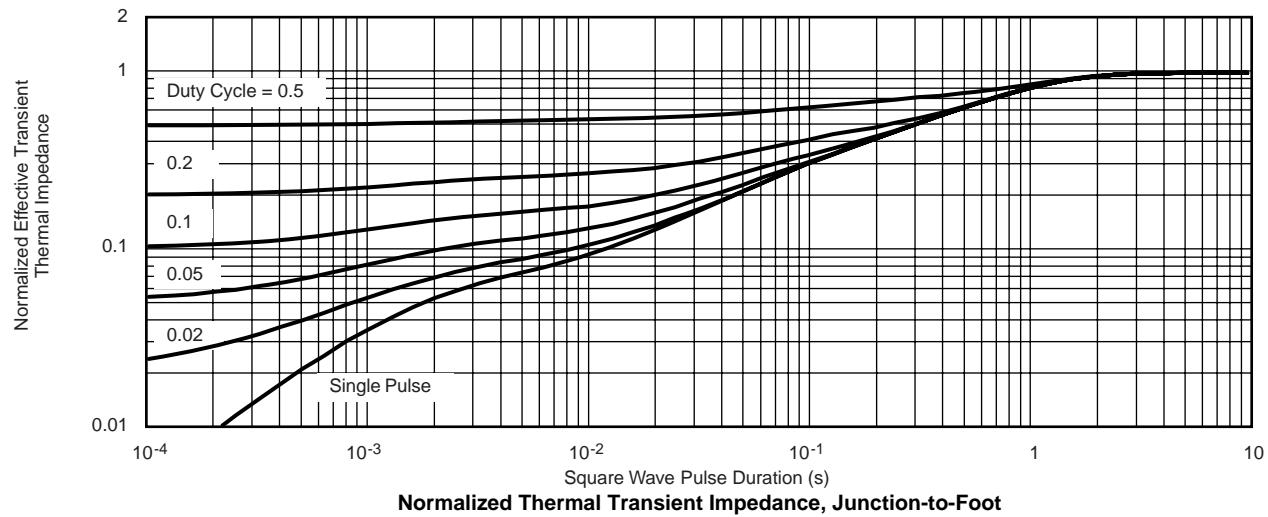
a. For design aid only; not subject to production testing.  
 b. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2\%$ .

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**  $25^\circ\text{C}$ , unless otherwise noted


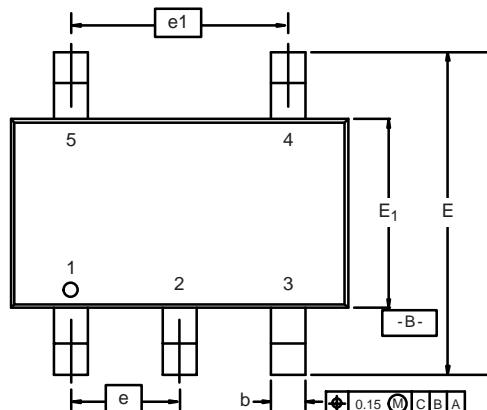
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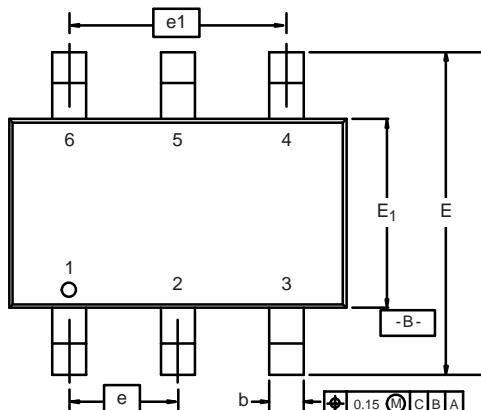
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## TSOP: 5/6-LEAD

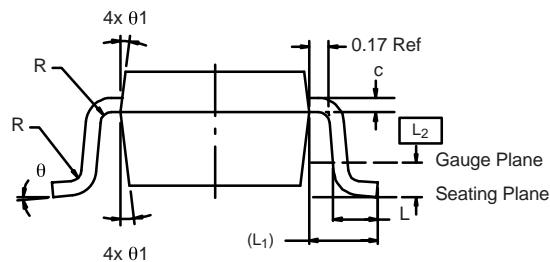
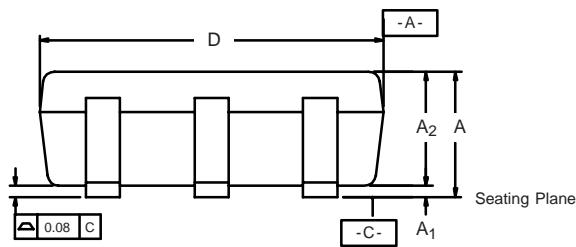
JEDEC Part Number: MO-193C



## 5-LEAD TSOP

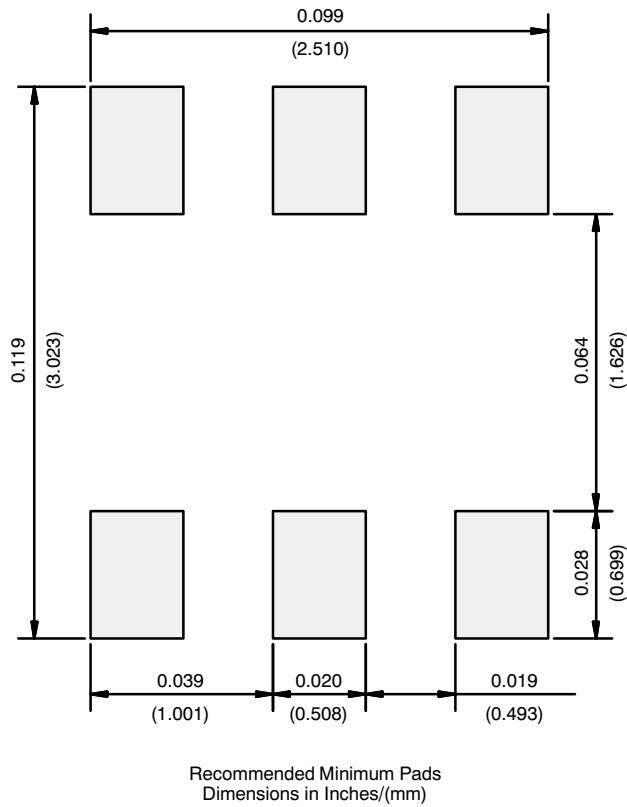


## 6-LEAD TSOP



Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
<b>A</b>	0.91	-	1.10	0.036	-	0.043
<b>A<sub>1</sub></b>	0.01	-	0.10	0.0004	-	0.004
<b>A<sub>2</sub></b>	0.90	-	1.00	0.035	0.038	0.039
<b>b</b>	0.30	0.32	0.45	0.012	0.013	0.018
<b>c</b>	0.10	0.15	0.20	0.004	0.006	0.008
<b>D</b>	2.95	3.05	3.10	0.116	0.120	0.122
<b>E</b>	2.70	2.85	2.98	0.106	0.112	0.117
<b>E<sub>1</sub></b>	1.55	1.65	1.70	0.061	0.065	0.067
<b>e</b>	0.95 BSC			0.0374 BSC		
<b>e<sub>1</sub></b>	1.80	1.90	2.00	0.071	0.075	0.079
<b>L</b>	0.32	-	0.50	0.012	-	0.020
<b>L<sub>1</sub></b>	0.60 Ref			0.024 Ref		
<b>L<sub>2</sub></b>	0.25 BSC			0.010 BSC		
<b>R</b>	0.10	-	-	0.004	-	-
<b>θ</b>	0°	4°	8°	0°	4°	8°
<b>θ<sub>1</sub></b>	7° Nom			7° Nom		

## RECOMMENDED MINIMUM PADS FOR TSOP-6



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