

# NTHD4N02FT1

Advance Information

## N-Channel 20 V Power MOSFET Schottky 1.0 A Barrier Rectifier ChipFET™ Package

### Features

- New Leadless, ChipFET Package Increases Temperature Dissipation
- Increased  $R_{DS(on)}$  Performance
- Ultra Low VF

### Applications

- Designed for Buck Converter, Buck-Boost Synchronous Rectification, Load Management in Battery Packs, Chargers, Cell Phones and the Portable Products

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

Rating	Symbol	5 secs	Steady State	Unit
Drain-Source Voltage	$V_{DS}$	20		V
Gate-Source Voltage	$V_{GS}$	$\pm 12$		V
Continuous Drain Current ( $T_J = 150^\circ\text{C}$ ) (Note 1) $T_A = 25^\circ\text{C}$ $T_A = 85^\circ\text{C}$	$I_D$	$\pm 4.2$ $\pm 3.0$	$\pm 3.1$ $\pm 2.2$	A
Pulsed Drain Current	$I_{DM}$	$\pm 10$		A
Continuous Source Current (Diode Conduction) (Note 1)	$I_S$	1.8	0.9	A
Maximum Power Dissipation (Note 1) $T_A = 25^\circ\text{C}$ (FET) $T_A = 85^\circ\text{C}$ (FET) $T_A = 25^\circ\text{C}$ (Schottky) $T_A = 85^\circ\text{C}$ (Schottky)	$P_D$	2.1 1.1 1.3 0.68	1.1 0.6 – –	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	–55 to +150		$^\circ\text{C}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	$T_L$	260		$^\circ\text{C}$

1. Surface Mounted on 1" x 1" FR4 Board.

This document contains information on a new product. Specifications and information herein are subject to change without notice.



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### MOSFET

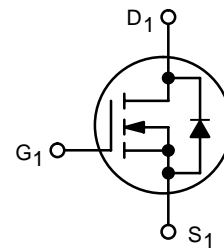
20 VOLTS, N-CHANNEL

$R_{DS(on)} = 75 \text{ m}\Omega @ V_{GS} = 4.5 \text{ V}$

$R_{DS(on)} = 143 \text{ m}\Omega @ V_{GS} = 2.5 \text{ V}$

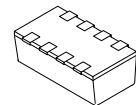
### SCHOTTKY

1.0 AMPS, 20 VOLTS

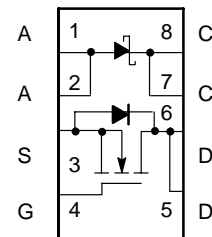


N-Channel MOSFET

ChipFET  
CASE 1206A  
STYLE 3

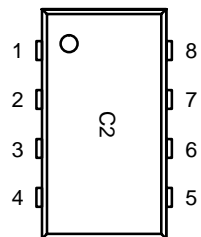


### PIN CONNECTIONS



(Top View)

### MARKING DIAGRAM



C2 = Specific Device Code

### ORDERING INFORMATION

Device	Package	Shipping
NTHD4N02FT1	ChipFET	3000/Tape & Reel

# NTHD4N02FT1

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient (Note 2) t ≤ 5 sec Steady State	R <sub>thJA</sub>	50 90	60 110	°C/W
Maximum Junction-to-Foot (Drain) Steady State	R <sub>thJF</sub>	30	40	°C/W

## ELECTRICAL CHARACTERISTICS (FET) (T<sub>J</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
<b>Static</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	0.6	–	–	V
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 12 V	–	–	± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V	–	–	1.0	μA
		V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 85°C	–	–	5.0	
Drain-Source On-State Resistance (Note 3)	r <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 3.1 A	–	0.065	0.075	Ω
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 2.3 A	–	0.115	0.143	
Forward Transconductance (Note 3)	g <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 5.0 A	–	8.0	–	S
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	I <sub>S</sub> = 0.9 A, V <sub>GS</sub> = 0 V	–	0.8	1.2	V

## Dynamic (Note 4)

Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10 Vdc, V <sub>GS</sub> = 4.5 V, f = 1.0 MHz	–	TBD	–	pF
Output Capacitance	C <sub>oss</sub>		–	TBD	–	
Transfer Capacitance	C <sub>rss</sub>		–	TBD	–	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 3.1 A	–	4.0	6.0	nC
Gate-Source Charge	Q <sub>gs</sub>		–	0.6	–	
Gate-Drain Charge	Q <sub>gd</sub>		–	1.3	–	
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 10 V, R <sub>L</sub> = 10 Ω I <sub>D</sub> ≈ 1.0 A, V <sub>GEN</sub> = 4.5 V, R <sub>G</sub> = 6 Ω	–	12	18	ns
Rise Time	t <sub>r</sub>		–	35	55	
Turn-Off Delay Time	t <sub>d(off)</sub>		–	19	30	
Fall Time	t <sub>f</sub>		–	9.0	15	
Source-Drain Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 0.9 A, di/dt = 100 A/μs	–	40	80	

## ELECTRICAL CHARACTERISTICS (Schottky) (T<sub>J</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Typ	T <sub>J</sub> = 25°C	Unit
Maximum Instantaneous Forward Voltage	V <sub>F</sub>	I <sub>F</sub> = 0.1 A <sub>dc</sub>	–	0.280	Vdc
		I <sub>F</sub> = 1.0 A <sub>dc</sub>	–	0.365	
Maximum Instantaneous Reverse	–	V <sub>R</sub> = 10 V <sub>dc</sub>	–	.25	mA
		V <sub>R</sub> = 20 V <sub>dc</sub>	–	.50	

2. Surface Mounted on 1" x 1" FR4 Board.

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

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

FET TYPICAL ELECTRICAL CHARACTERISTICS

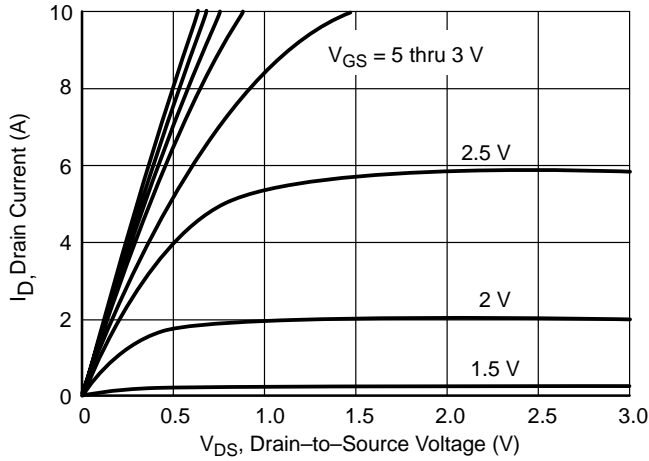


Figure 1. Output Characteristics

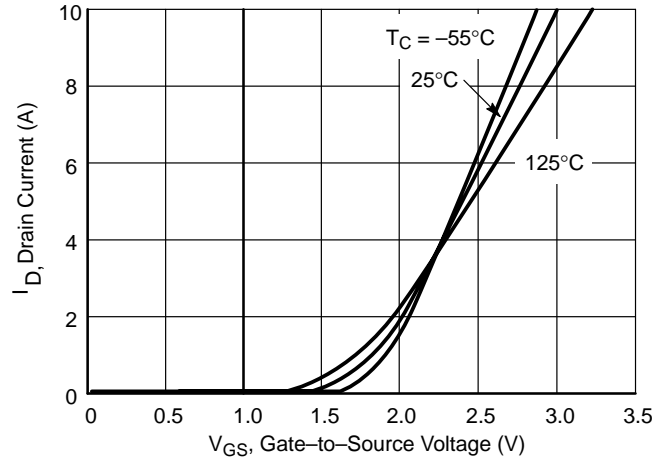


Figure 2. Transfer Characteristics

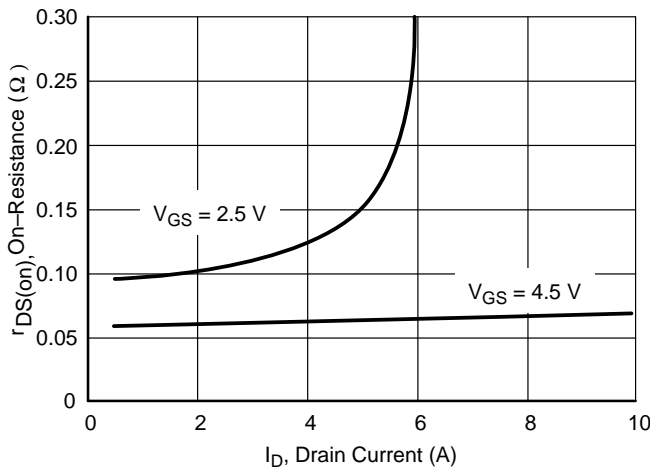


Figure 3. On-Resistance vs. Drain Current

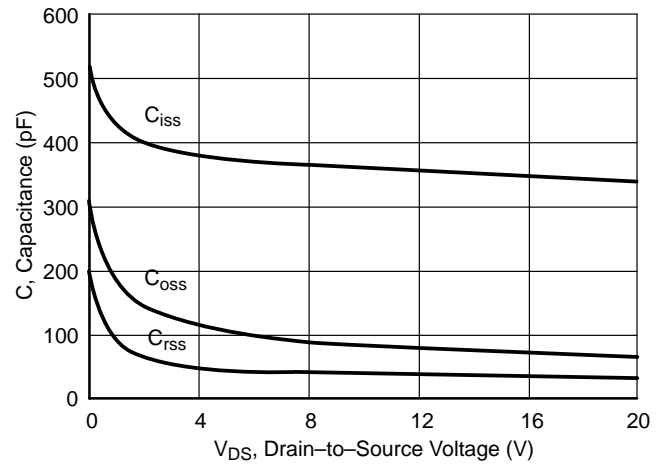


Figure 4. Capacitance

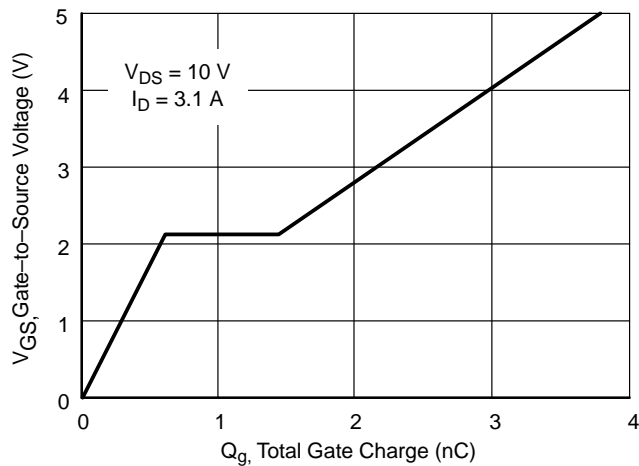


Figure 5. Gate Charge

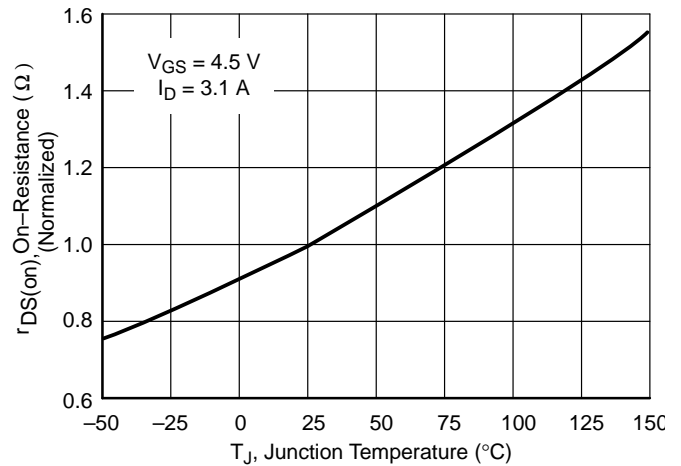


Figure 6. On-Resistance vs. Junction Temperature

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## FET TYPICAL ELECTRICAL CHARACTERISTICS

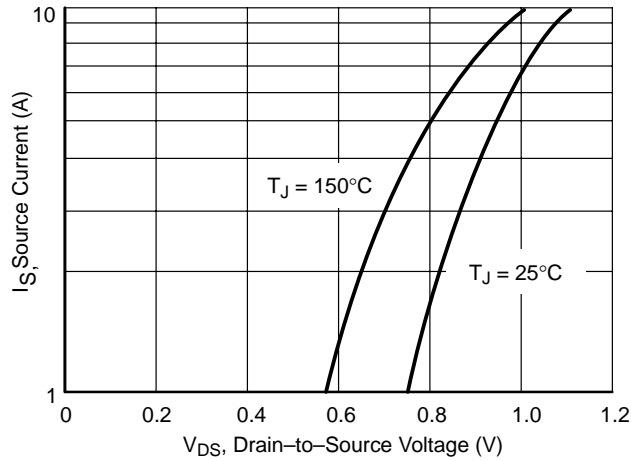


Figure 7. Source-Drain Diode Forward Voltage

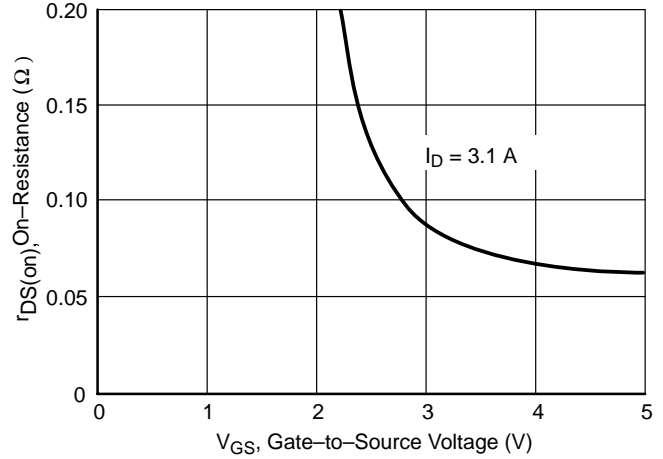


Figure 8. On-Resistance vs. Gate-to-Source Voltage

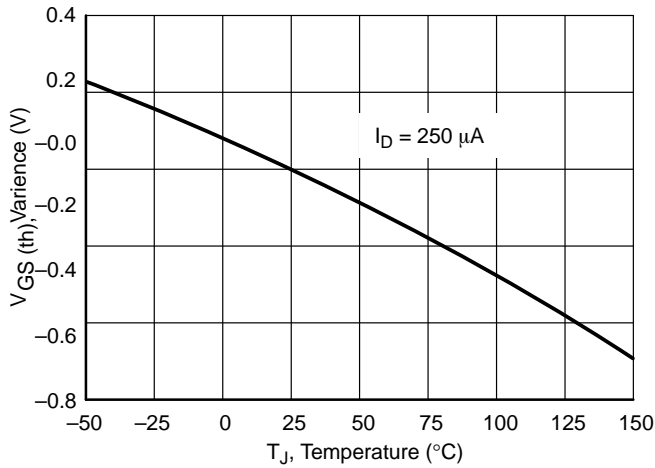


Figure 9. Threshold Voltage

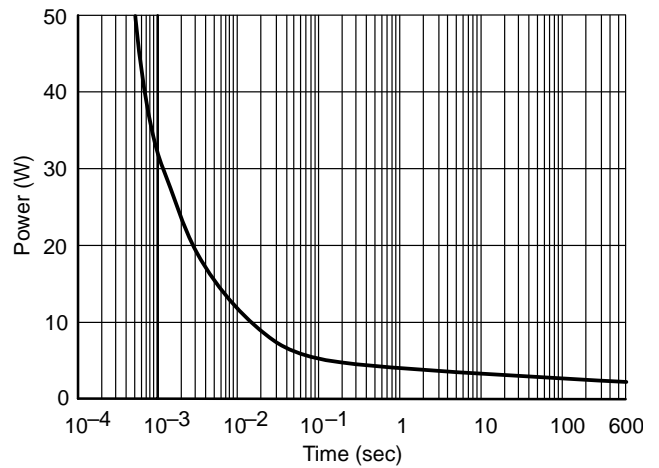


Figure 10. Single Pulse Power

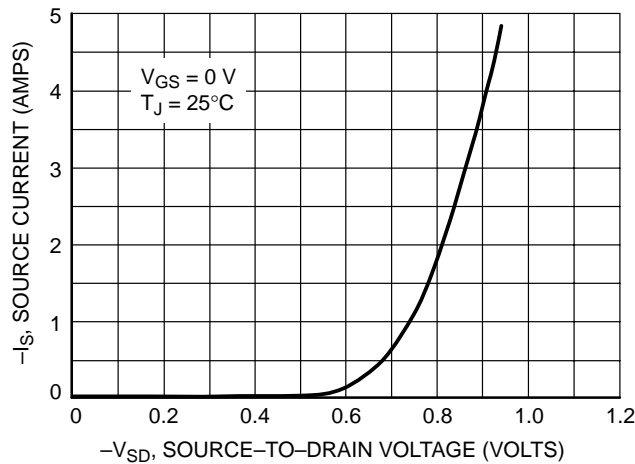


Figure 11. Diode Forward Voltage vs. Current

FET TYPICAL ELECTRICAL CHARACTERISTICS

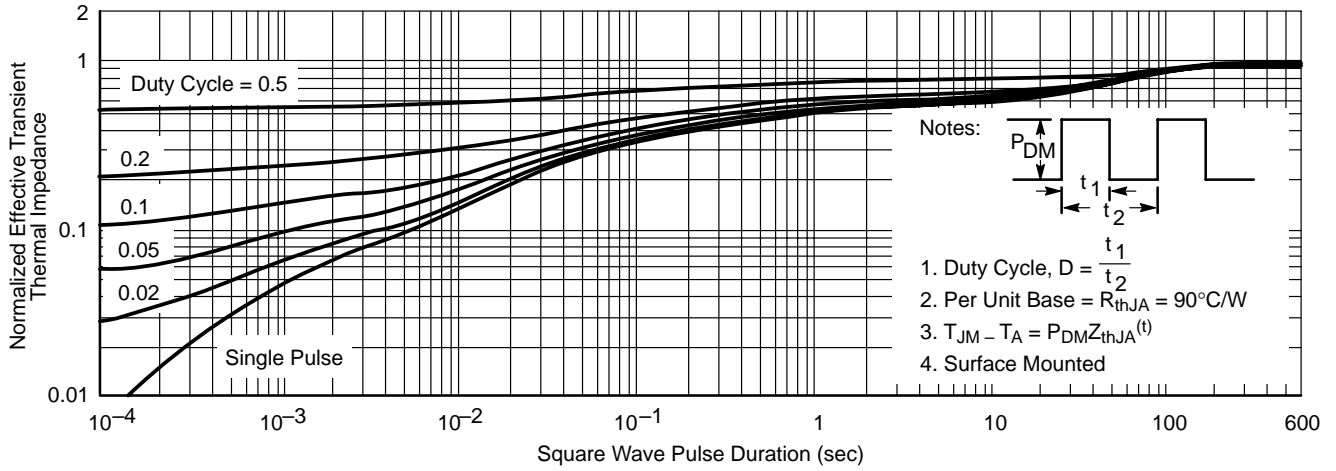


Figure 12. Normalized Thermal Transient Impedance, Junction-to-Ambient

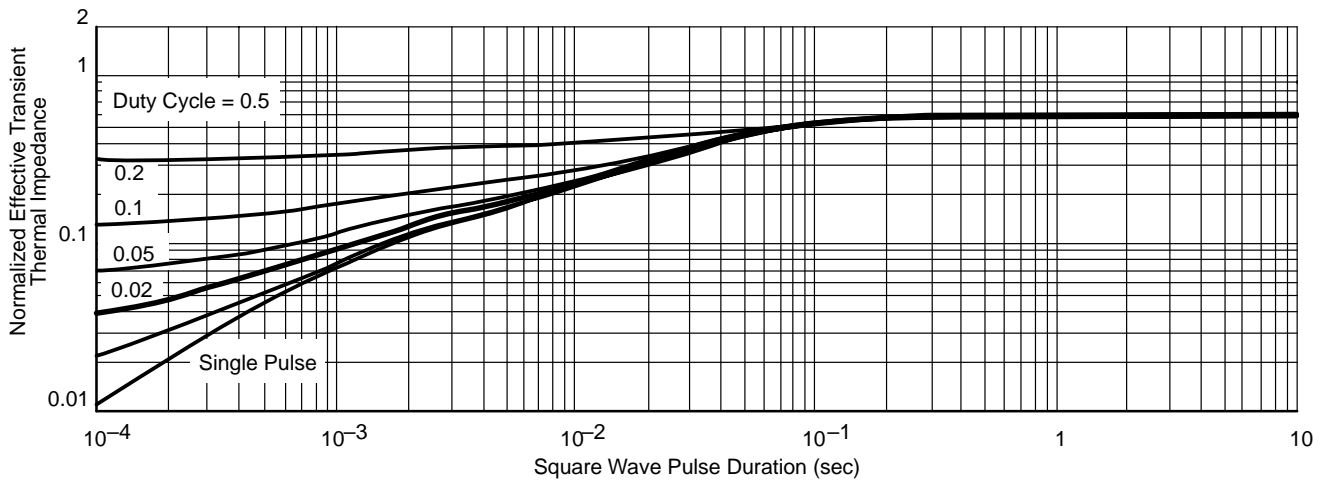


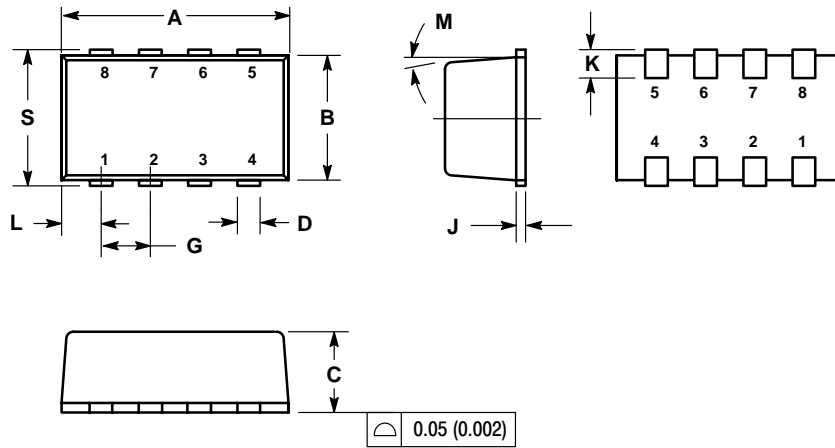
Figure 13. Normalized Thermal Transient Impedance, Junction-to-Foot

**Notes**

# NTHD4N02FT1

## PACKAGE DIMENSIONS

ChipFET  
CASE 1206A-03  
ISSUE E



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MOLD GATE BURRS SHALL NOT EXCEED 0.13 MM PER SIDE.
4. LEADFRAME TO MOLDED BODY OFFSET IN HORIZONTAL AND VERTICAL SHALL NOT EXCEED 0.08 MM.
5. DIMENSIONS A AND B EXCLUSIVE OF MOLD GATE BURRS.
6. NO MOLD FLASH ALLOWED ON THE TOP AND BOTTOM LEAD SURFACE.
7. 1206A-01 AND 1206A-02 OBSOLETE. NEW STANDARD IS 1206A-03.


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.95	3.10	0.116	0.122
B	1.55	1.70	0.061	0.067
C	1.00	1.10	0.039	0.043
D	0.25	0.35	0.010	0.014
G	0.65 BSC		0.025 BSC	
J	0.10	0.20	0.004	0.008
K	0.28	0.42	0.011	0.017
L	0.55 BSC		0.022 BSC	
M	5° NOM		5° NOM	
S	1.80	2.00	0.072	0.080

### STYLE 3:

- PIN 1: A  
2. A  
3. S  
4. G  
5. D  
6. D  
7. C  
8. C

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