

NTMFS4708N

Power MOSFET

30 V, 19 A, Single N-Channel, SOIC-8 FL

Features

- Fast Switching Times
- Low Gate Charge
- Low $R_{DS(on)}$
- Low Inductance SOIC-8 Package
- These are Pb-Free Devices

Applications

- Notebooks, Graphics Cards
- DC-DC Converters
- Synchronous Rectification

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DSS}	30	V
Gate-to-Source Voltage			V_{GS}	± 20	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^{\circ}\text{C}$	I_D	11.5	A
		$T_A = 85^{\circ}\text{C}$		8.0	
	$t \leq 10\text{ s}$	$T_A = 25^{\circ}\text{C}$		19	
Power Dissipation (Note 1)	Steady State	$T_A = 25^{\circ}\text{C}$	P_D	2.2	W
	$t \leq 10\text{ s}$			6.25	
Continuous Drain Current (Note 2)	Steady State	$T_A = 25^{\circ}\text{C}$	I_D	7.8	A
		$T_A = 85^{\circ}\text{C}$		5.6	
Power Dissipation (Note 2)		$T_A = 25^{\circ}\text{C}$	P_D	1.0	W
Pulsed Drain Current	$t_p \leq 10\text{ }\mu\text{s}$		I_{DM}	58	A
Operating Junction and Storage Temperature			T_J , T_{STG}	-55 to 150	$^{\circ}\text{C}$
Source Current (Body Diode)			I_S	6.25	A
Single Pulse Drain-to-Source Avalanche Energy. $V_{DD} = 25\text{ V}$, $V_{GS} = 10\text{ V}$, $I_{PK} = 7.0\text{ A}$, $L = 10\text{ mH}$, $R_G = 25\text{ }\Omega$			E_{AS}	245	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	$^{\circ}\text{C}$

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	56.5	$^\circ\text{C/W}$
Junction-to-Ambient – $t \leq 10\text{ s}$ (Note 1)	$R_{\theta JA}$	20	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	124	

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

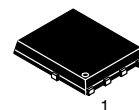
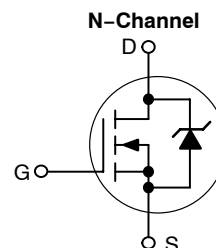
1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).
2. Surface-mounted on FR4 board using the minimum recommended pad size (Cu area = 0.412 in sq).



ON Semiconductor®

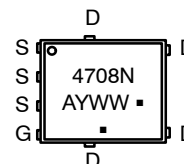
<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
30 V	7.3 m Ω @ 10 V	19 A
	10.1 m Ω @ 4.5 V	



**SOIC-8 FLAT LEAD
CASE 488AA
STYLE 1**

MARKING DIAGRAM & PIN ASSIGNMENT



4708N = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTMFS4708NT1G	SOIC-8 FL (Pb-Free)	1500 / Tape & Reel
NTMFS4708NT3G	SOIC-8 FL (Pb-Free)	5000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

NTMFS4708N

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			10		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 24 V	T _J = 25°C		1.0	μA
			T _J = 125°C		50	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20V			±100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250 μA	1.0		2.5	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			5.0		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 11.5 A		7.3	10	mΩ
		V _{GS} = 4.5 V, I _D = 9.5 A		10.1	14	
Forward Transconductance	g _{FS}	V _{DS} = 15 V, I _D = 11.5 A		23		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 24 V		970		pF
Output Capacitance	C _{OSS}			440		
Reverse Transfer Capacitance	C _{RSS}			115		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 15 V; I _D = 11.5 A		10	15	nC
Threshold Gate Charge	Q _{G(TH)}			1.3		
Gate-to-Source Charge	Q _{GS}			2.6		
Gate-to-Drain Charge	Q _{GD}			4.8		
Gate Resistance	R _G			1.95		Ω

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 10 V, V _{DD} = 15 V, I _D = 1.0 A, R _G = 3.0 Ω		6.7		ns
Rise Time	t _r			4.3		
Turn-Off Delay Time	t _{d(off)}			20		
Fall Time	t _f			16		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 6.25 A	T _J = 25°C		0.78	1.0	V
			T _J = 125°C		0.60		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dI = 100 A/μs, I _S = 6.25 A		32		ns	
Charge Time	t _a			15.5			
Discharge Time	t _b			16.5			
Reverse Recovery Charge	Q _{RR}			24		nC	

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

4. Switching characteristics are independent of operating junction temperatures.

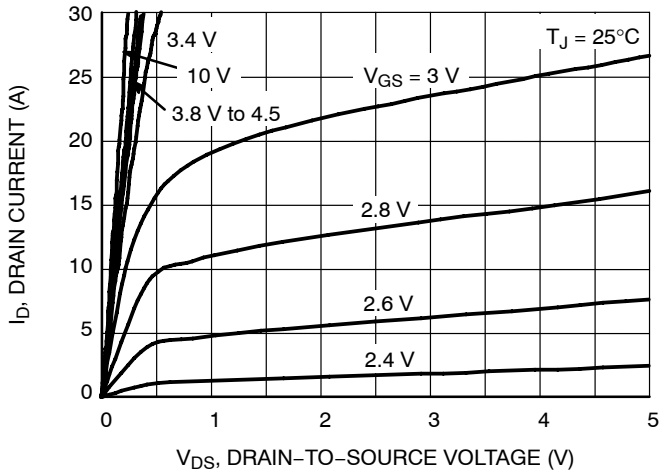


Figure 1. On-Region Characteristics

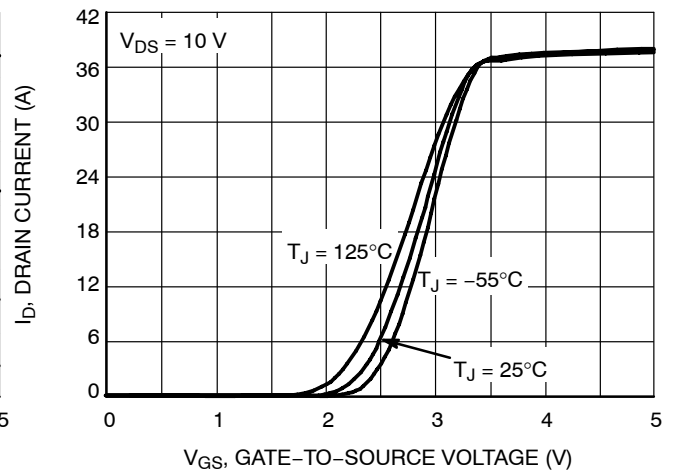


Figure 2. Transfer Characteristics

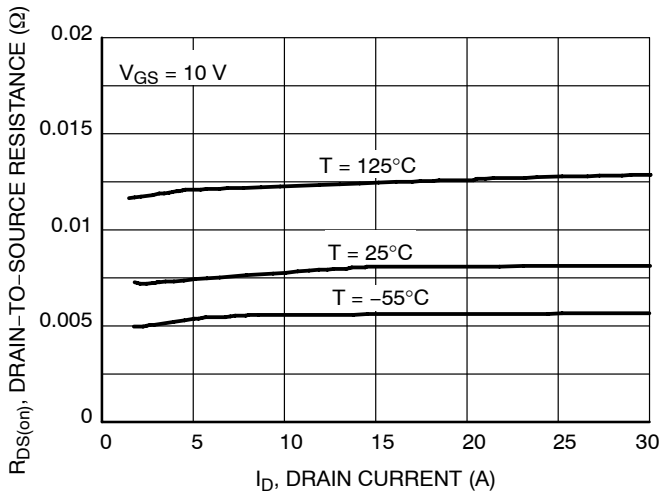


Figure 3. On-Resistance versus Drain Current and Temperature

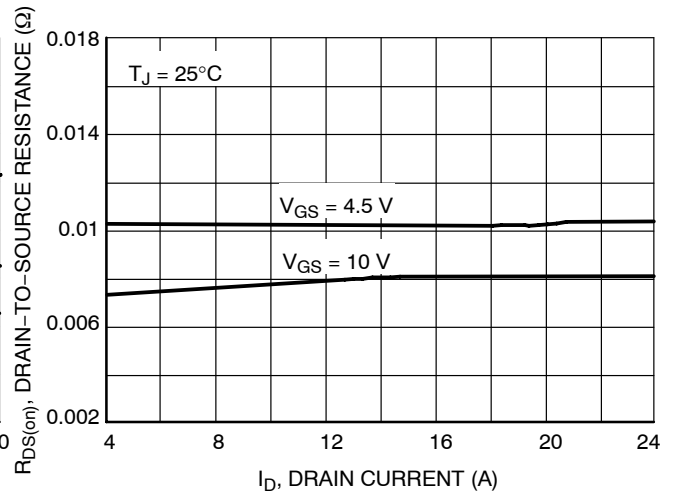


Figure 4. On-Resistance versus Drain Current and Gate Voltage

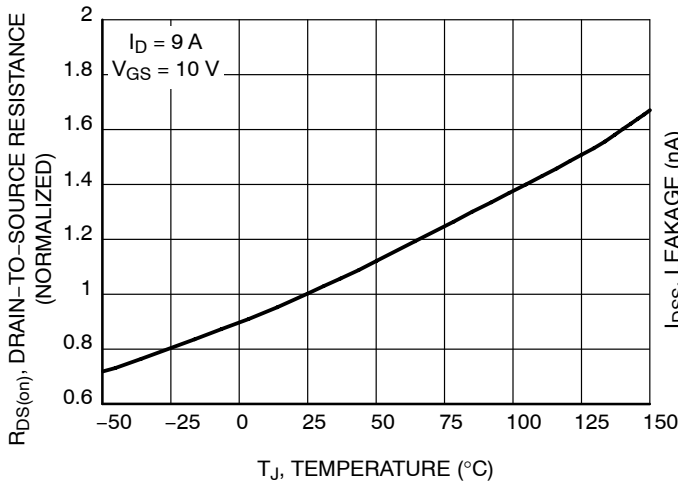


Figure 5. On-Resistance Variation with Temperature

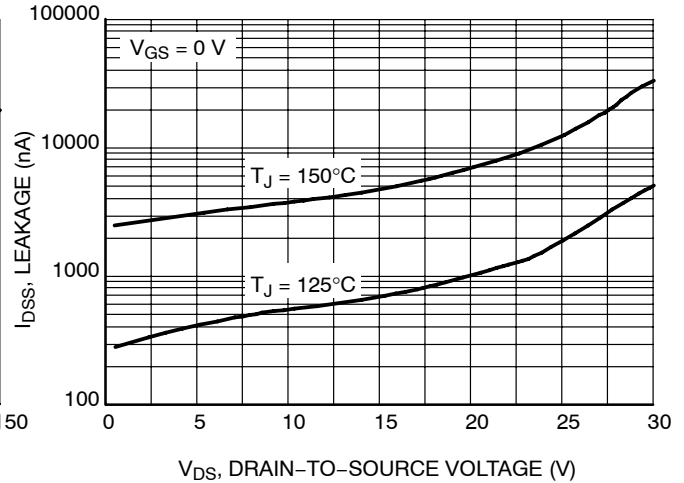


Figure 6. Drain-to-Source Leakage Current versus Voltage

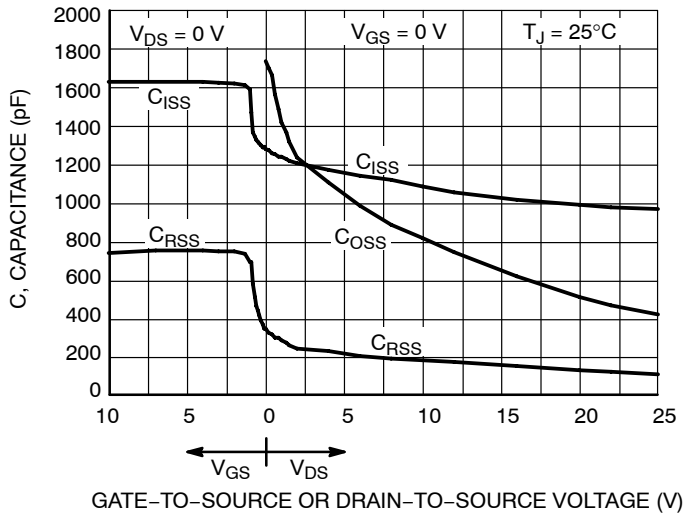


Figure 7. Capacitance Variation

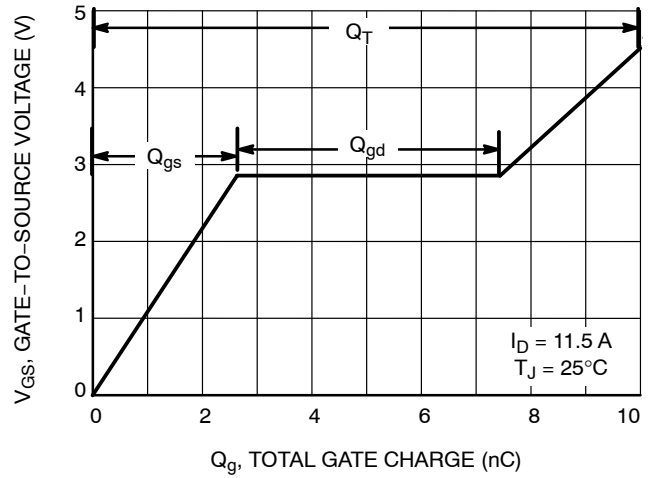


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

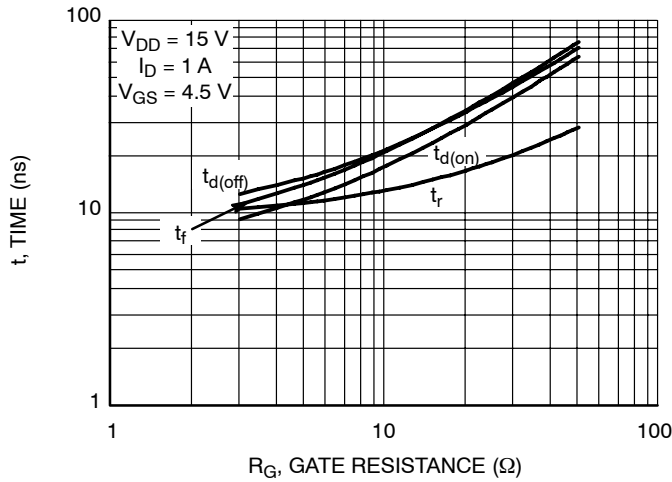


Figure 9. Resistive Switching Time Variation versus Gate Resistance

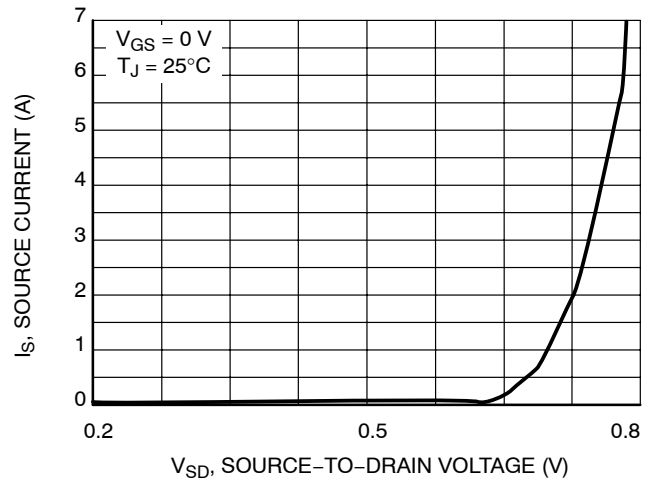


Figure 10. Diode Forward Voltage versus Current

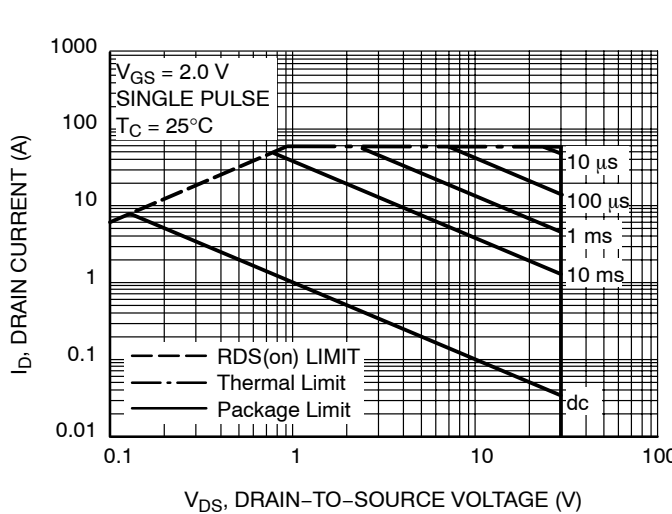


Figure 11. Maximum Rated Forward Biased Safe Operating Area

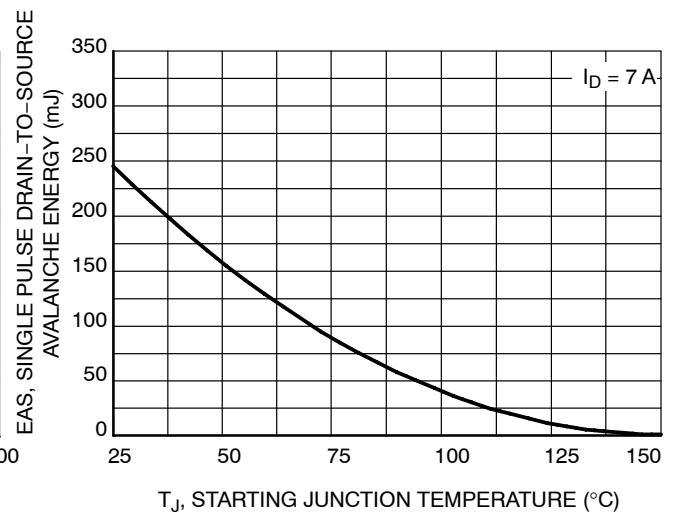
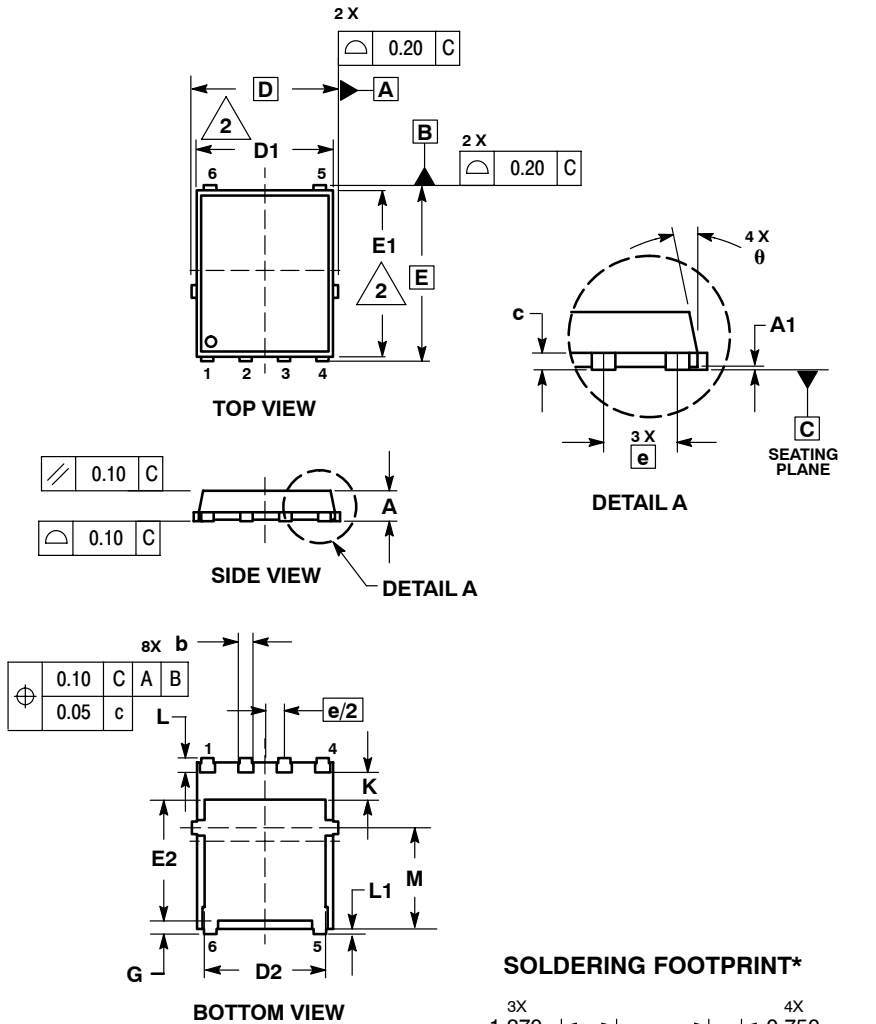


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

NTMFS4708N

PACKAGE DIMENSIONS

DFN6 5*6*1 1.27 PITCH
(SO8 FL)
CASE 488AA-01
ISSUE B



NOTES:

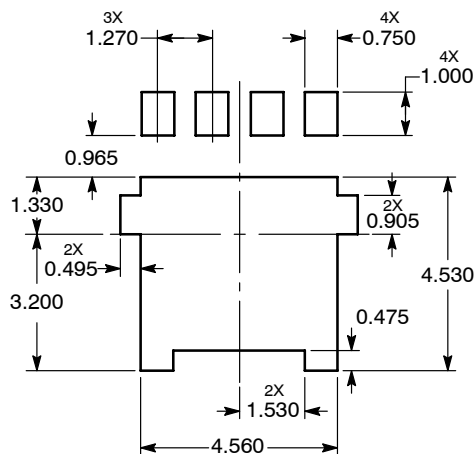
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.90	0.99	1.20
A1	0.00	---	0.05
b	0.33	0.41	0.51
c	0.23	0.28	0.33
D	5.15 BSC		
D1	4.50	4.90	5.10
D2	3.50	---	4.22
E	6.15 BSC		
E1	5.50	5.80	6.10
E2	3.45	---	4.30
e	1.27 BSC		
G	0.51	0.61	0.71
K	0.51	---	---
L	0.51	0.61	0.71
L1	0.05	0.17	0.20
M	3.00	3.40	3.80
θ	0 °	---	12 °


STYLE 1:

- PIN 1: SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN
6. DRAIN

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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