

# MOSFET – Power, N-Channel, UltraFET

55 V, 75 A, 7 mΩ

## FDH5500-F085

### Features

- Typ  $R_{DS(on)}$  = 5.2 mΩ at  $V_{GS} = 10\text{ V}$ ,  $I_D = 75\text{ A}$
- Typ  $Q_{g(10)}$  = 118 nC at  $V_{GS} = 10\text{ V}$
- Simulation Models  
–Temperature Compensated PSpice™ and Saber® Models
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- AEC-Q101 Qualified and PPAP Capable
- This Device is Pb-Free and is RoHS Compliant

### Applications

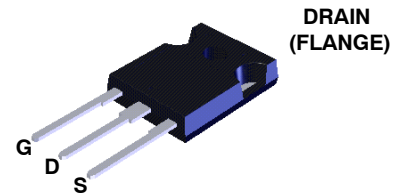
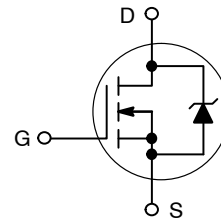
- DC Linear Mode Control
- Solenoid and Motor Control
- Switching Regulators
- Automotive Systems



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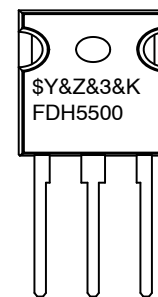
[www.onsemi.com](http://www.onsemi.com)

$V_{DSS}$	$R_{DS(ON)}\text{ MAX}$	$I_D\text{ MAX}$
55 V	7 mΩ	75 A



JEDEC TO-247  
CASE 340CK

### MARKING DIAGRAM



\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Data Code (Year & Week)
&K	= Lot
FDH5500	= Specific Device Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

## FDH5500–F085

### MOSFET MAXIMUM RATINGS ( $T_C = 25^\circ\text{C}$ , Unless otherwise noted)

Symbol	Parameter	Value	Unit	
$V_{DSS}$	Drain to Source Voltage (Note 1)	55	V	
$V_{DGR}$	Gate to Gate Voltage ( $R_{GS} = 20\text{ k}\Omega$ ) (Note 1)	55	V	
$V_{GS}$	Gate to Source Voltage	$\pm 20$	V	
$I_D$	Drain Current Continuous ( $T_C < 135^\circ\text{C}$ , $V_{GS} = 10\text{ V}$ )	75	A	
	Pulsed	Figure 4		
$E_{AS}$	Single Pulse Avalanche Energy (Note 2)	864	mJ	
$P_D$	Power Dissipation	( $T_C = 25^\circ\text{C}$ )	375	W
		- Derate Above $25^\circ\text{C}$	2.5	W/ $^\circ\text{C}$
$T_J, T_{STG}$	Operating and Storage Temperature	$-55$ to $+175$	$^\circ\text{C}$	
$T_L$	Max. Lead Temp. for Soldering (at 1.6 mm from case for 10 sec)	300	$^\circ\text{C}$	
$T_{pkg}$	Max. Package Temp. for Soldering (Package Body for 10 sec)	260	$^\circ\text{C}$	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Starting  $T_J = 25^\circ\text{C}$  to  $175^\circ\text{C}$ .
2. Starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.48\text{ mH}$ ,  $I_{AS} = 60\text{ A}$

### THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance Junction to Case	0.4	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-247, $1\text{ in}^2$ copper pad area	30	$^\circ\text{C}/\text{W}$

### PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FDH5500	FDH5500–F085	TO-247	Tube	N/A	30 Units

# FDH5500-F085

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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### OFF CHARACTERISTICS

B <sub>VDSS</sub>	Drain to Source Breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0 V	55			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 45 V			1	μA
		V <sub>DS</sub> = 50 V, V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 45 V, T <sub>C</sub> = 150°C			250	
I <sub>GSS</sub>	Gate to Source Leakage Current	V <sub>GS</sub> = ±20 V			±100	nA

### ON CHARACTERISTICS

V <sub>GS(TH)</sub>	Gate to Source Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA	2.0	2.9	4.0	V
R <sub>DS(ON)</sub>	Drain to Source On Resistance	I <sub>D</sub> = 75 A, V <sub>GS</sub> = 10 V		5.2	7	mΩ

### DYNAMIC CHARACTERISTICS

C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, f = 1 MHz		3565		pF
C <sub>OSS</sub>	Output Capacitance			1310		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			395		pF
Q <sub>g(TOT)</sub>	Total Gate Charge at 20 V	V <sub>GS</sub> = 0 V to 20 V	V <sub>DD</sub> = 30 V I <sub>D</sub> = 75 A R <sub>L</sub> = 0.4 Ω I <sub>g</sub> = 1.0 mA	206	268	nC
Q <sub>g(10)</sub>	Total Gate Charge 10 V	V <sub>GS</sub> = 0 V to 10 V		118	153	nC
Q <sub>g(TH)</sub>	Threshold Gate Charge	V <sub>GS</sub> = 0 V to 2 V		6.2	8.1	nC
Q <sub>gs</sub>	Gate to Source Gate Charge	V <sub>DD</sub> = 30 V, I <sub>D</sub> = 75 A, R <sub>L</sub> = 0.4 Ω, I <sub>g</sub> = 1.0 mA		17.8		nC
Q <sub>gd</sub>	Gate to Drain "Miller" Charge			51		nC

### SWITCHING CHARACTERISTICS

t <sub>on</sub>	Turn-On Time	V <sub>DD</sub> = 30 V I <sub>D</sub> = 75 A R <sub>L</sub> = 0.4 Ω V <sub>GS</sub> = 10 V R <sub>GS</sub> = 2.5 Ω			185	ns
t <sub>d(on)</sub>	Turn-On Delay Time			13.7		ns
t <sub>r</sub>	Rise Time			102		ns
t <sub>d(off)</sub>	Turn-Off Delay Time			34		ns
t <sub>f</sub>	Fall Time			22		ns
t <sub>off</sub>	Turn-Off Time				91	ns

### DRAIN-SOURCE DIODE CHARACTERISTICS

V <sub>SD</sub>	Source to Drain Diode Voltage	I <sub>SD</sub> = 75 A		1	1.25	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> = 75 A, dI <sub>SD</sub> /dt = 100 A/μs		60	78	ns
Q <sub>rr</sub>	Reverse Recovery Charge			77	100	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS

( $T_C = 25^\circ\text{C}$  unless otherwise noted)

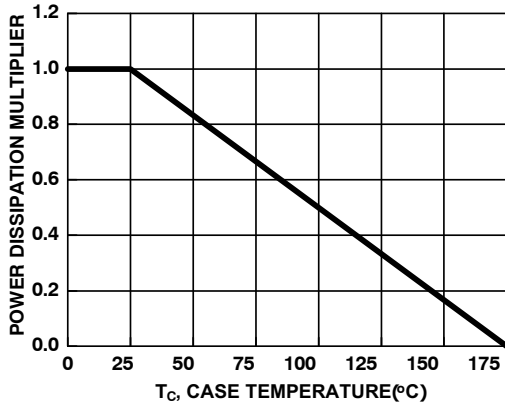


Figure 1. Normalized Power Dissipation vs. Case Temperature

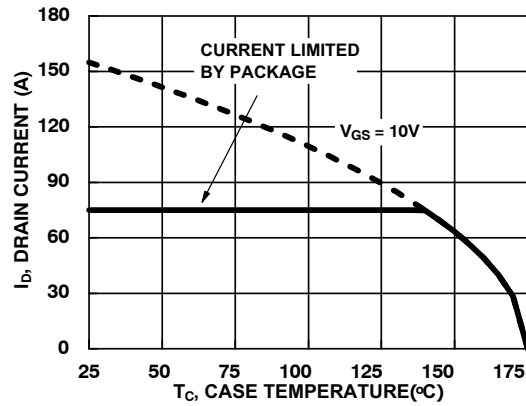


Figure 2. Maximum Continuous Drain Current vs. Case Temperature

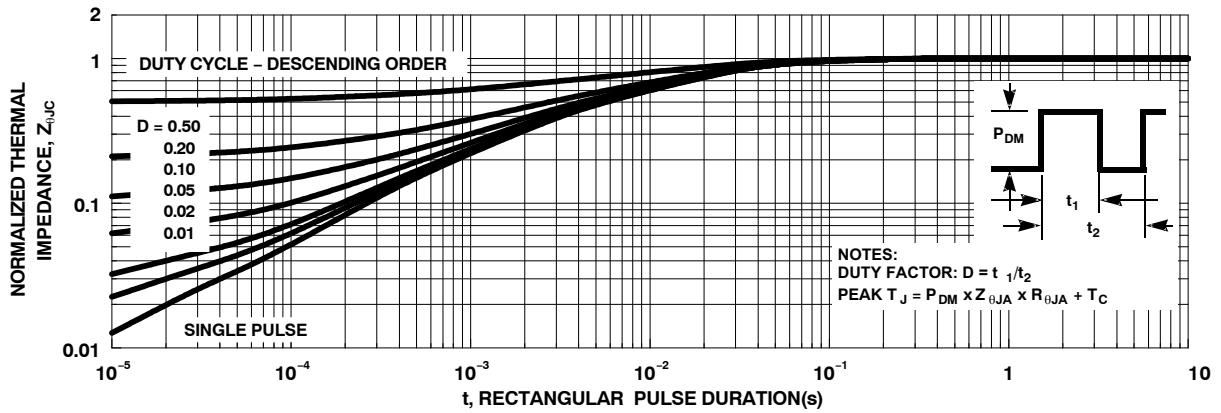


Figure 3. Normalized Maximum Transient Thermal Impedance

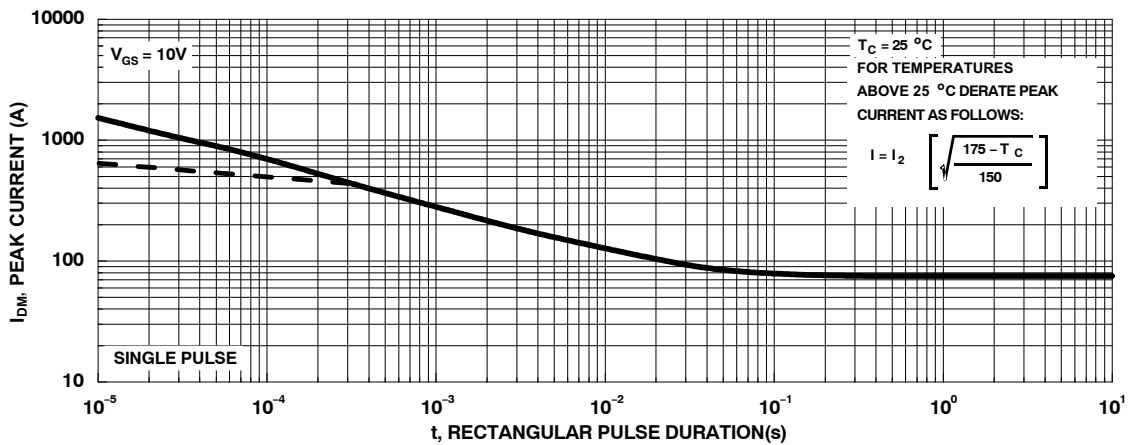


Figure 4. Peak Current Capability

TYPICAL CHARACTERISTICS (Continued)

( $T_C = 25^\circ\text{C}$  unless otherwise noted)

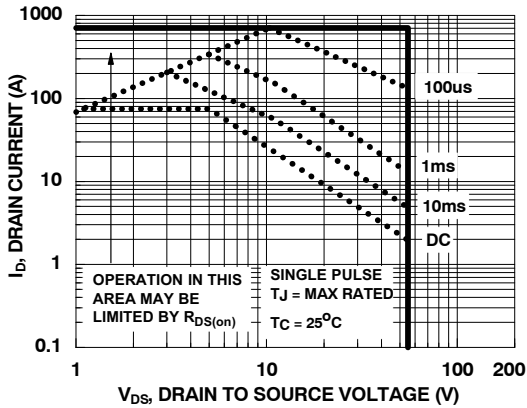


Figure 5. Forward Bias Safe Operating Area

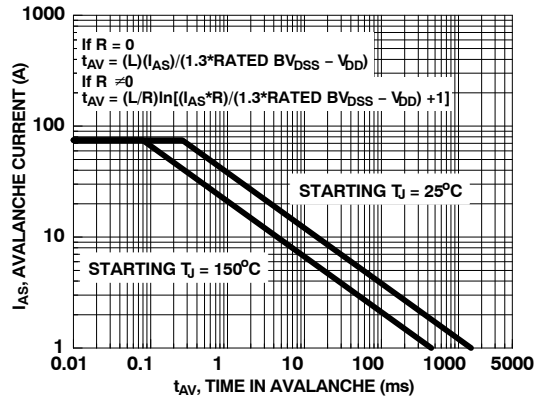


Figure 6. Unclamped Inductive Switching Capability

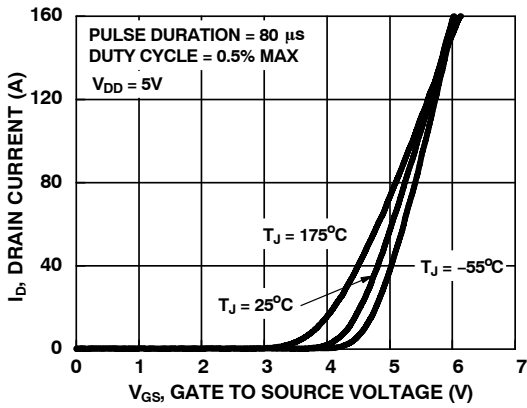


Figure 7. Transfer Characteristics

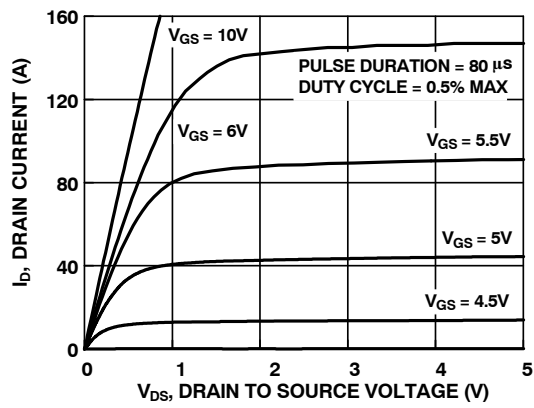


Figure 8. Saturation Characteristics

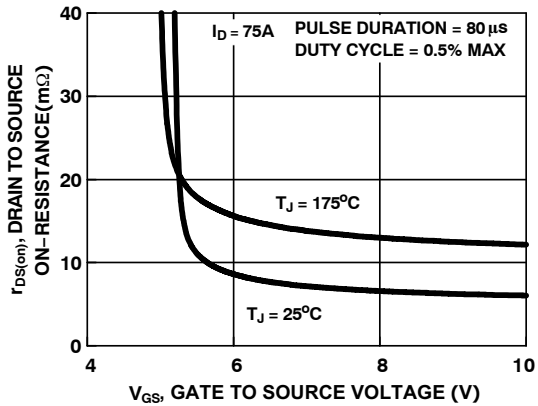


Figure 9. Drain to Source On Resistance Variation vs Gate to Source Voltage

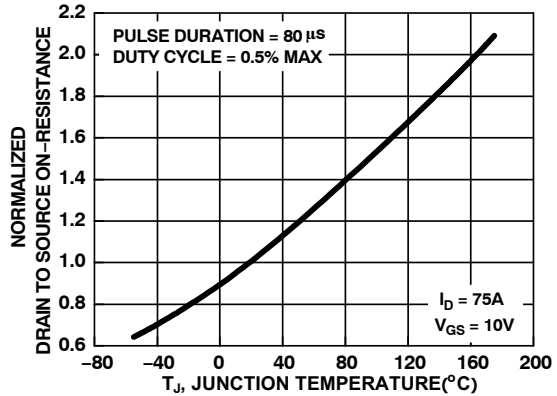


Figure 10. Normalized Drain to Source On Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS (Continued)

( $T_C = 25^\circ\text{C}$  unless otherwise noted)

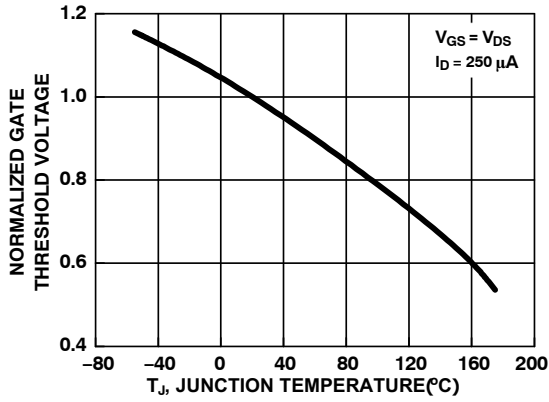


Figure 11. Normalized Gate Threshold Voltage vs. Junction Temperature

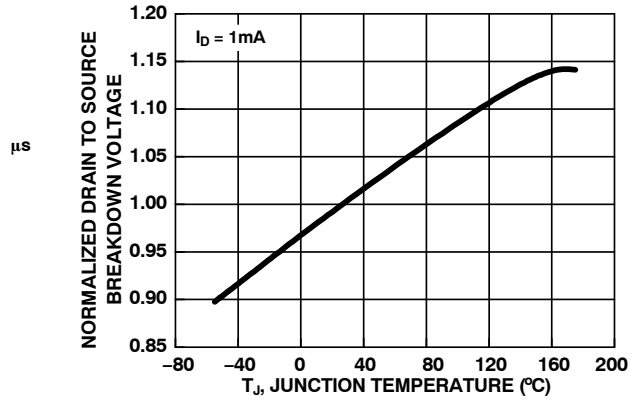


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

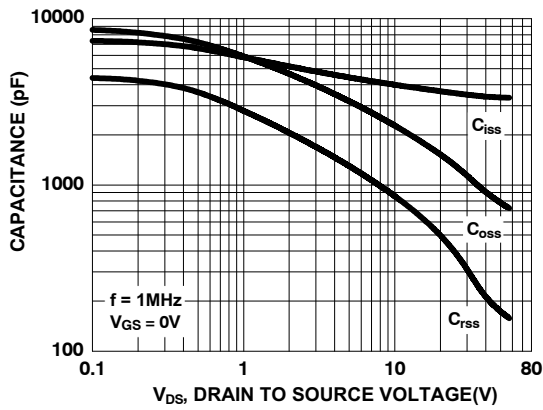


Figure 13. Capacitance vs. Drain to Source Voltage

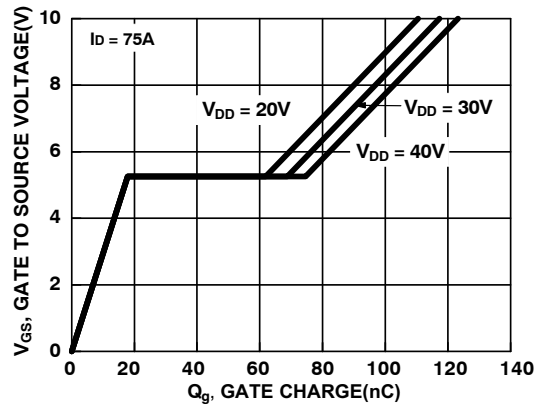
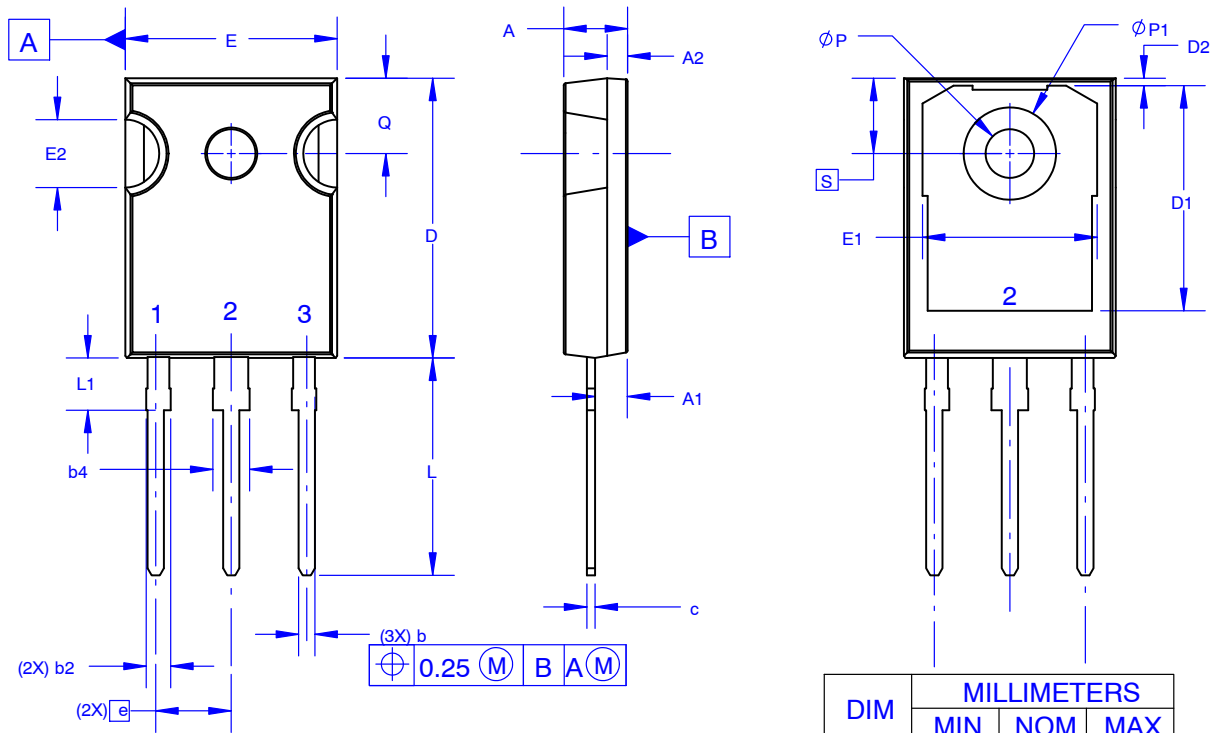


Figure 14. Gate Charge vs. Gate to Source Voltage

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**TO-247-3LD SHORT LEAD**  
**CASE 340CK**  
**ISSUE A**

DATE 31 JAN 2019



NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

**GENERIC MARKING DIAGRAM\***



- XXXX = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- ZZ = Assembly Lot Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
b4	2.42	2.54	2.66
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	13.08	~	~
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	5.56	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
∅P	3.51	3.58	3.65
∅P1	6.60	6.80	7.00
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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