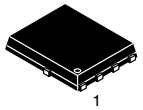
MOSFET – Power, Single N-Channel, SO8-FL

30 V, 462 A, 0.58 mΩ

NTMFS0D55N03CG

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
30 V	0.58 mΩ @ 10 V	462 A



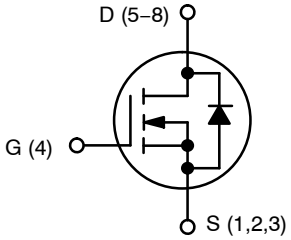
DFN5 (SO−8FL)
CASE 506EZ

Features

- Wide SOA to Improve Inrush Current Management
- Advanced Package (5x6mm) with Excellent Thermal Conduction
- Ultra Low $R_{DS(on)}$ to Improve System Efficiency
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Hot Swap Application
- Power Load Switch
- Battery Management and Protection



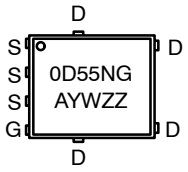
N−CHANNEL MOSFET

MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Symbol	Parameter			Value	Unit
V_{DSS}	Drain−to−Source Voltage			30	V
V_{GS}	Gate−to−Source Voltage			±20	V
I_D	Continuous Drain Current $R_{\theta JC}$ (Note 3)	Steady State	T_C = 25°C	462	A
			T_C =100°C	326	
P_D	Power Dissipation $R_{\theta JC}$ (Note 3)		T_C = 25°C	199	W
I_D	Continuous Drain Current $R_{\theta JA}$ (Notes 1, 3)	Steady State	T_A = 25°C	65	A
			T_A = 100°C	46	
P_D	Power Dissipation $R_{\theta JA}$ (Notes 1, 3)		T_A = 25°C	3.9	W
I_D	Continuous Drain Current $R_{\theta JA}$ (Notes 2, 3)	Steady State	T_A = 25°C	35	A
			T_A = 100°C	25	
P_D	Power Dissipation $R_{\theta JA}$ (Notes 2, 3)		T_A = 25°C	1.1	W
I_{DM}	Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		900	A
I_S	Source Current (Body Diode)			166	A
E_{AS}	Single Pulse Drain−to−Source Avalanche Energy (I_L = 45.5 A_{pk})			1346	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range			−55 to +175	°C
T_L	Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			260	°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.

MARKING DIAGRAM



A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceabililty

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

THERMAL RESISTANCE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction−to−Case − Steady State (Note 1)	0.75	°C/W
$R_{\theta JA}$	Junction−to−Ambient − Steady State (Note 1)	38	
$R_{\theta JA}$	Junction−to−Ambient − Steady State (Note 2)	133	

1. Surface−mounted on FR4 board using 1 in^2 pad, 2 oz Cu pad.
2. Surface−mounted on FR4 board using minimum pad, 2 oz Cu pad.
3. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

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

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
$V_{(BR)DSS}$	Drain−to−Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA		30	−	−	V
$V_{(BR)DSS}/T_J$	Drain−to−Source Breakdown Voltage Temperature Coefficient	I_D = 250 μA. ref to 25°C		−	12	−	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0 V, V_{DS} = 30 V	T_J = 25°C	−	−	1.0	μA
			T_J = 125°C	−	−	100	
I_{GSS}	Gate−to−Source Leakage Current	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 4)							
$V_{GS(TH)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 330 μA		1.3	−	2.2	V
$V_{GS(TH)}/T_J$	Threshold Temperature Coefficient	I_D = 330 μA. ref to 25°C		−	−5	−	mV/°C
$R_{DS(on)}$	Drain−to−Source On Resistance	V_{GS} = 10 V, I_D = 30 A		−	0.5	0.58	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 3 V, I_D = 30 A		−	108	−	S
R_G	Gate Resistance	T_A = 25°C		−	0.4	3.0	Ω
CHARGES AND CAPACITANCES							
C_{ISS}	Input Capacitance	V_{GS} = 0 V, V_{DS} = 15 V, f = 1 MHz		10150	14500	18500	pF
C_{OSS}	Output Capacitance			4501	6430	8359	
C_{RSS}	Reverse Transfer Capacitance			48	120	222	
$Q_{G(TOT)}$	Total Gate Charge	V_{GS} = 10 V, V_{DS} = 15 V; I_D = 30 A		121.1	173	224.9	nC
$Q_{G(TH)}$	Threshold Gate Charge			15.4	22	28.6	
Q_{GS}	Gate−to−Source Charge			27.3	39	50.7	
Q_{GD}	Gate−to−Drain Charge			4.4	11	20.5	
SWITCHING CHARACTERISTICS (Note 5)							
$t_{d(ON)}$	Turn−On Delay Time	V_{GS} = 10 V, V_{DS} = 15 V, I_D = 30 A, R_G = 3.0 Ω		−	30	−	ns
t_r	Rise Time			−	13	−	
$t_{d(OFF)}$	Turn−Off Delay Time			−	98	−	
t_f	Fall Time			−	20	−	
DRAIN−SOURCE DIODE CHARACTERISTICS							
V_{SD}	Forward Diode Voltage	V_{GS} = 0 V, I_S = 30 A	T_J = 25°C	−	0.75	1.2	V
			T_J = 125°C	−	0.62	−	
t_{RR}	Reverse Recovery Time	V_{GS} = 0 V, dIS/dt = 100 A/μs, V_{DS} = 15 V, I_S = 30 A		−	104	−	ns
Q_{RR}	Reverse Recovery Charge			−	177	−	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.

4. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

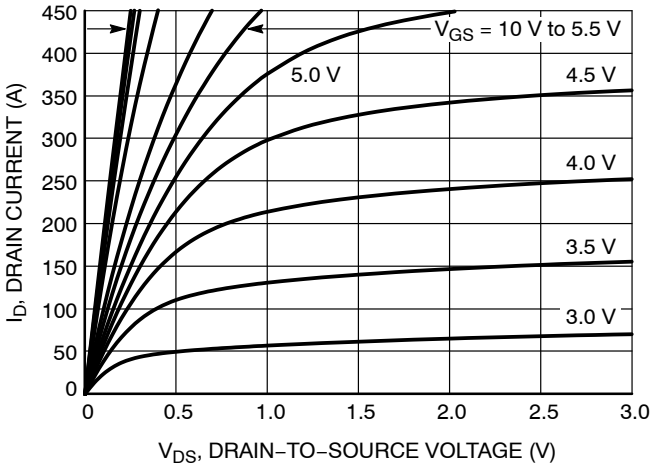


Figure 1. On−Region Characteristics

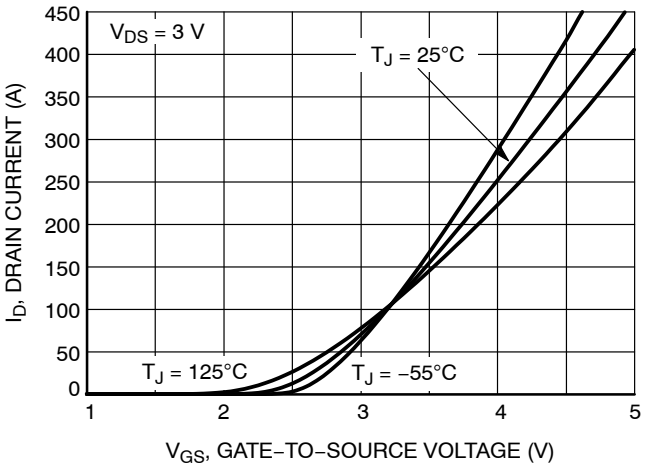


Figure 2. Transfer Characteristics

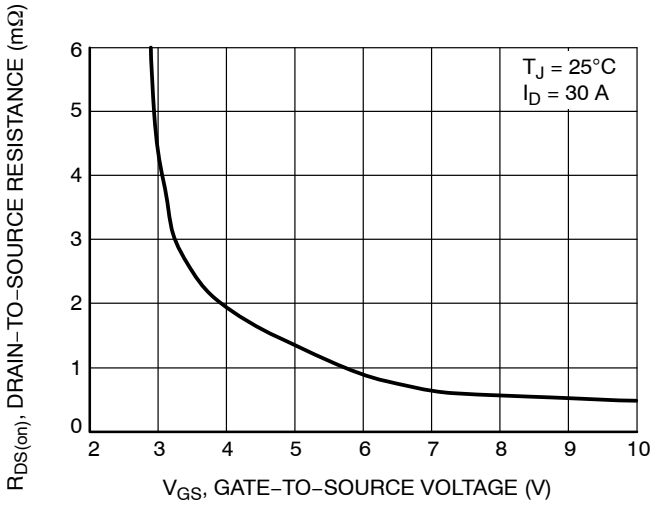


Figure 3. On−Resistance vs. Gate−to−Source Voltage

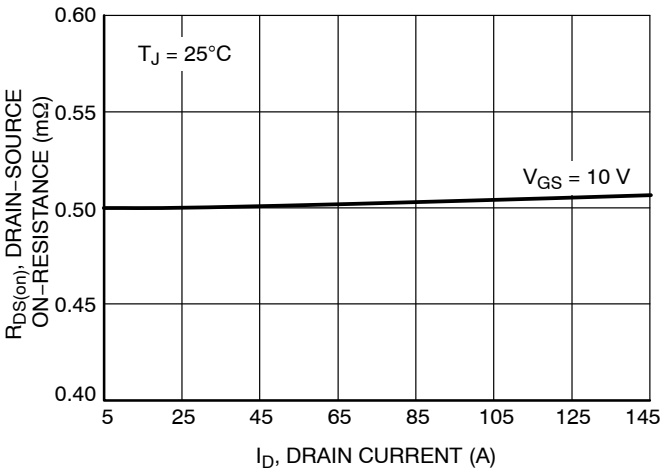


Figure 4. On−Resistance vs. Drain Current

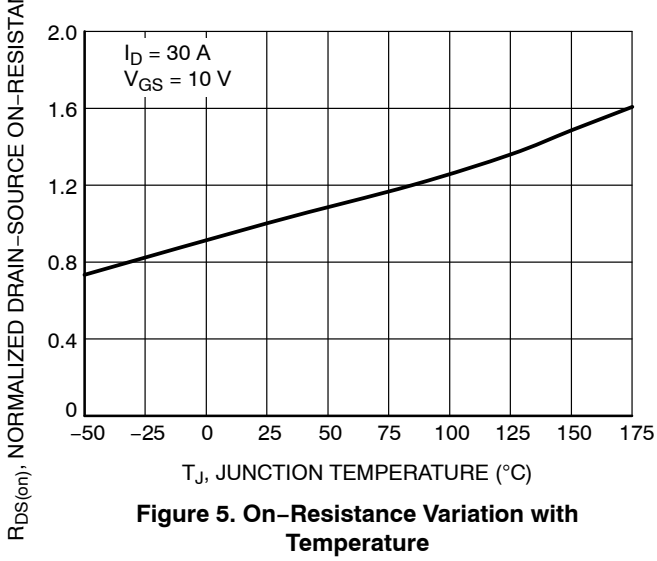


Figure 5. On−Resistance Variation with Temperature

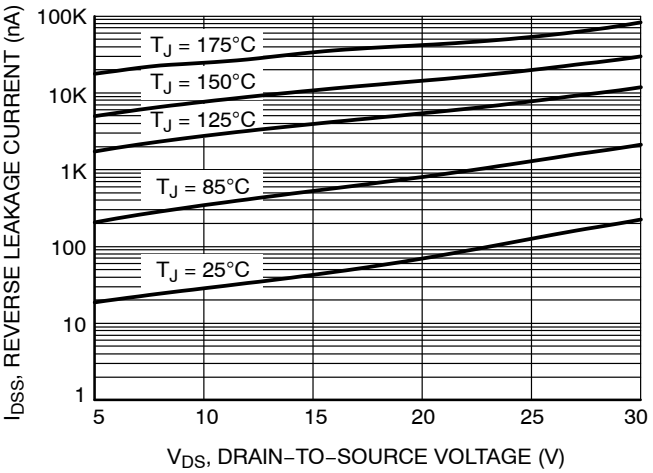


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

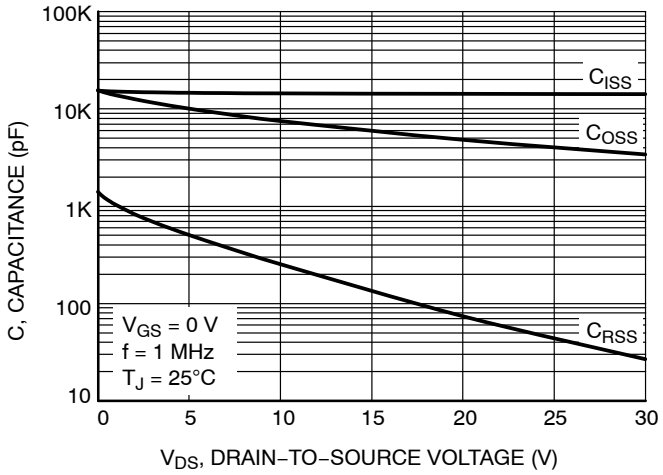


Figure 7. Capacitance Variation

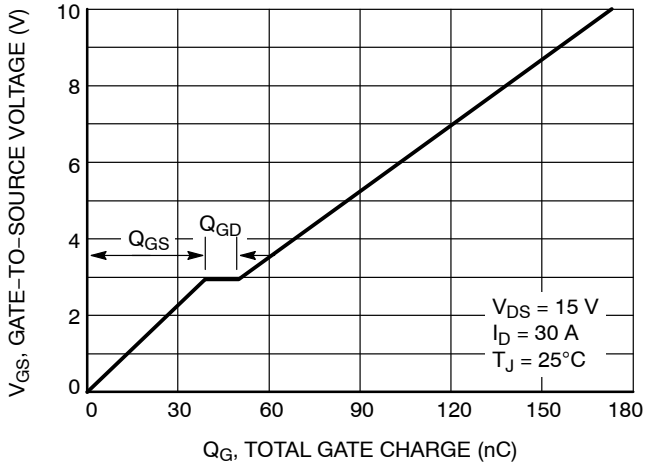


Figure 8. Gate−to−Source Voltage vs. Total Charge

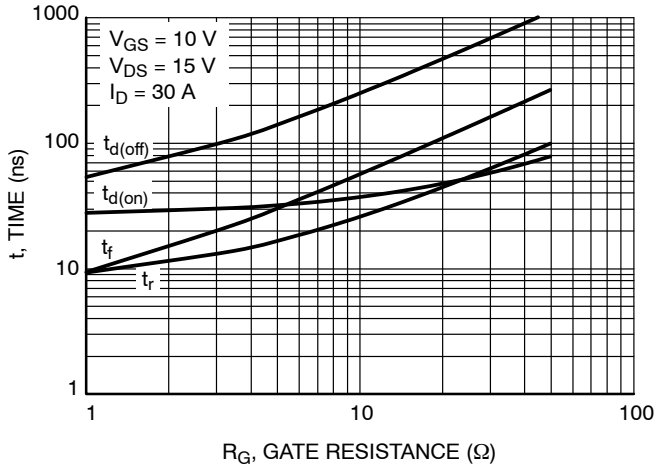


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

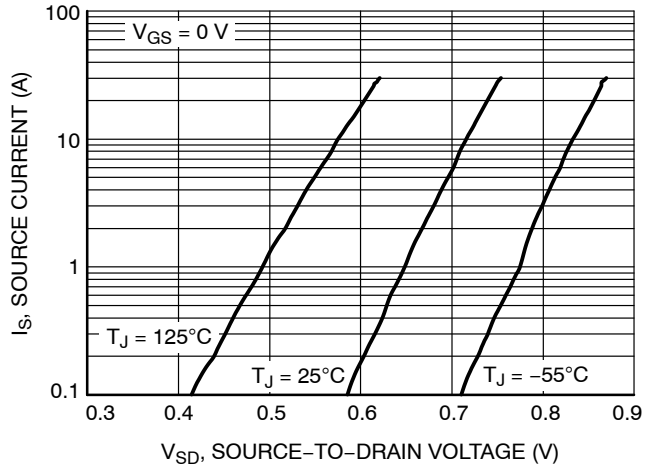


Figure 10. Diode Forward Voltage vs. Current

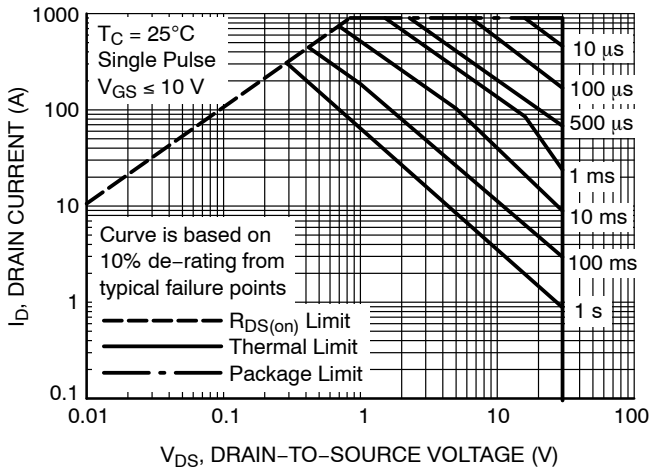


Figure 11. Safe Operating Area

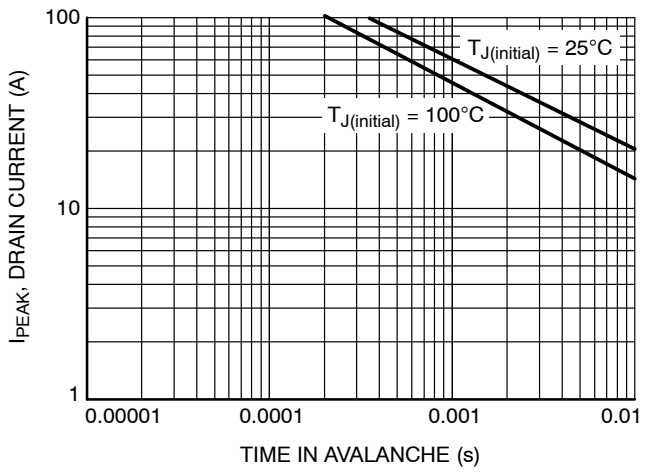


Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS (continued)

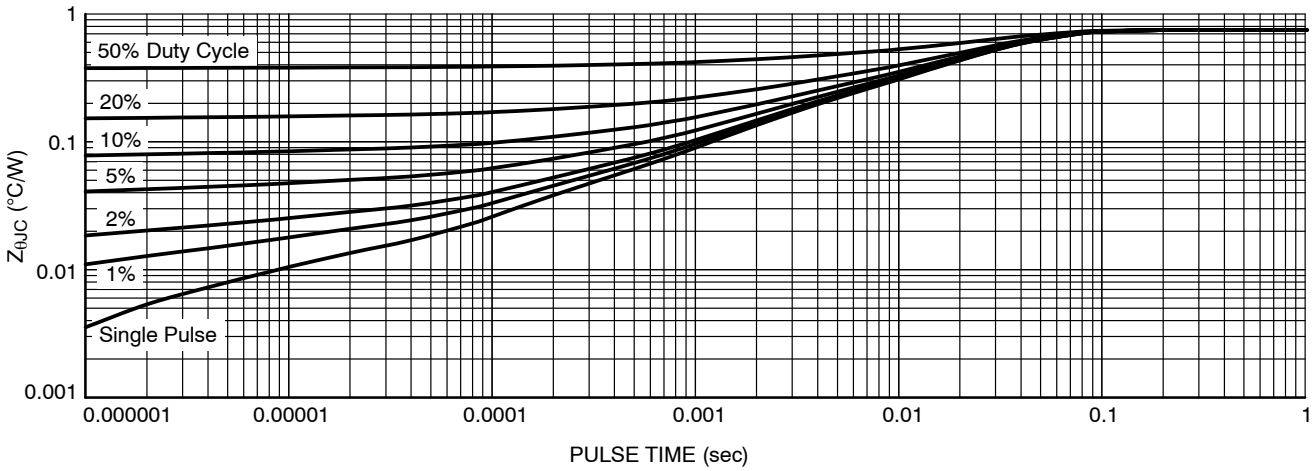
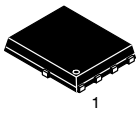


Figure 13. Junction−to−Case Transient Thermal Response

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping†
NTMFS0D55N03CGT1G	0D55NG	DFN5 (Pb−Free)	1,500 / 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.

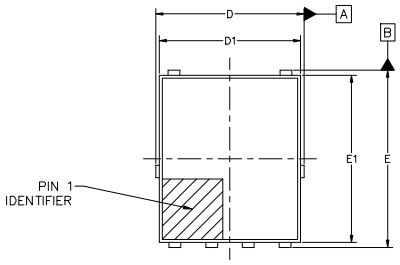


SCALE 2:1

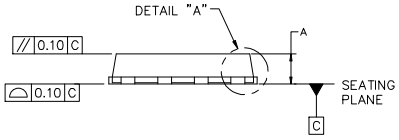
DFN5, 4.90 x 5.90 x 1.00, 1.27P
CASE 506EZ
ISSUE B

DATE 16 SEP 2024

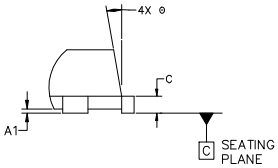
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.



TOP VIEW

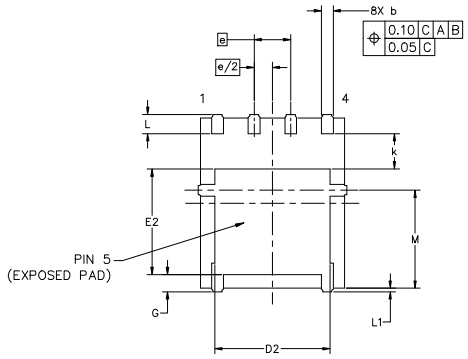


SIDE VIEW



DETAIL "A"
SCALED 2:1

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.00	---	0.05
b	0.33	0.41	0.51
c	0.23	0.28	0.33
D	5.00	5.15	5.30
D1	4.70	4.90	5.10
D2	3.80	4.00	4.20
E	6.00	6.15	6.30
E1	5.70	5.90	6.10
E2	3.45	3.80	3.85
e	1.27 BSC		
G	0.51	0.575	0.71
k	1.10	1.20	1.40
L	0.51	0.575	0.71
L1	0.125 REF		
M	3.00	3.40	3.80
θ	0°	---	12°

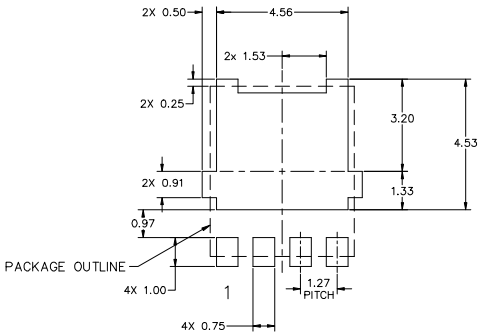


BOTTOM VIEW

GENERIC MARKING DIAGRAM*

XXXXXX = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

*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.



RECOMMENDED MOUNTING FOOTPRINT

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

DOCUMENT NUMBER:	**98AON24855H**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	**DFN5, 4.90 x 5.90 x 1.00, 1.27P**		**PAGE 1 OF 1**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales