

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

## 30 V, 0.58 mΩ, 462 A



ON Semiconductor®

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## NTMFS0D55N03CG

### 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

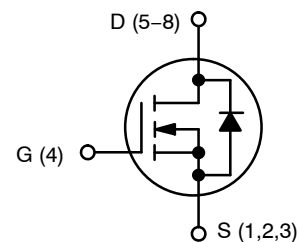
### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

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

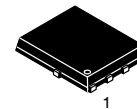
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface-mounted on FR4 board using 1 in<sup>2</sup> 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.

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

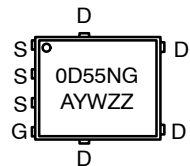


N-CHANNEL MOSFET



DFN5 (SO-8FL)  
CASE 506EZ

### MARKING DIAGRAMS



- A = Assembly Location
- Y = Year
- W = Work Week
- ZZ = Lot Traceability

### ORDERING INFORMATION

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

# NTMFS0D55N03CG

## THEMAL RESISTANCE MAXIMUM RATINGS

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

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 250\ \mu\text{A}$ , ref to $25^\circ\text{C}$		12		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = 30\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		100	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$			100	nA

### ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 330\ \mu\text{A}$	1.3		2.2	V
Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	$I_D = 330\ \mu\text{A}$ , ref to $25^\circ\text{C}$		-5		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 30\text{ A}$		0.5	0.58	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS} = 3\text{ V}, I_D = 30\text{ A}$		108		S
Gate Resistance	$R_G$	$T_A = 25^\circ\text{C}$		0.4	3.0	$\Omega$

### CHARGES AND CAPACITANCES

Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, V_{DS} = 15\text{ V}, f = 1\text{ MHz}$	10150	14500	18500	pF
Output Capacitance	$C_{OSS}$		4501	6430	8359	
Reverse Transfer Capacitance	$C_{RSS}$		48	120	222	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V}; I_D = 30\text{ A}$	121.1	173	224.9	nC
Threshold Gate Charge	$Q_{G(TH)}$		15.4	22	28.6	
Gate-to-Source Charge	$Q_{GS}$		27.3	39	50.7	
Gate-to-Drain Charge	$Q_{GD}$		4.4	11	20.5	

### SWITCHING CHARACTERISTICS (Note 5)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DS} = 15\text{ V}, I_D = 30\text{ A}, R_G = 3.0\ \Omega$		30		ns
Rise Time	$t_r$			13		
Turn-Off Delay Time	$t_{d(OFF)}$			98		
Fall Time	$t_f$			20		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 30\text{ A}$	$T_J = 25^\circ\text{C}$		0.75	1.2	V
			$T_J = 125^\circ\text{C}$		0.62		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, V_{DS} = 15\text{ V}, I_S = 30\text{ A}$			104		ns
Reverse Recovery Charge	$Q_{RR}$				177		nC

4. Pulse Test: pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
5. Switching characteristics are independent of operating junction temperatures.

# NTMFS0D55N03CG

## TYPICAL CHARACTERISTICS

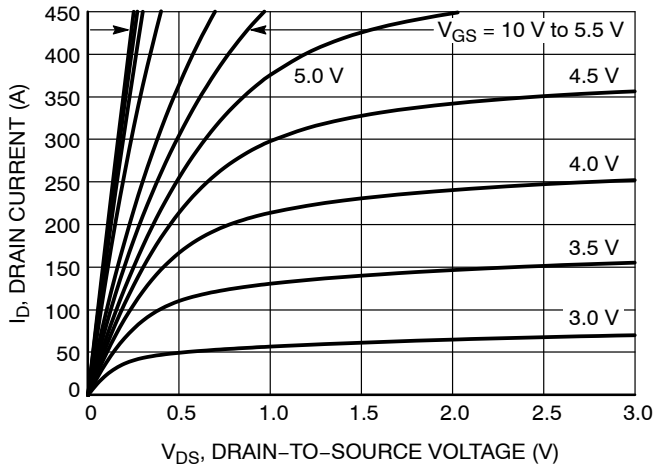


Figure 1. On-Region Characteristics

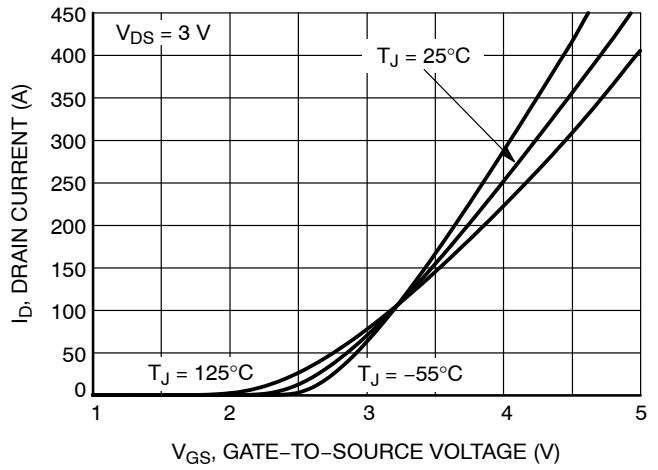


Figure 2. Transfer Characteristics

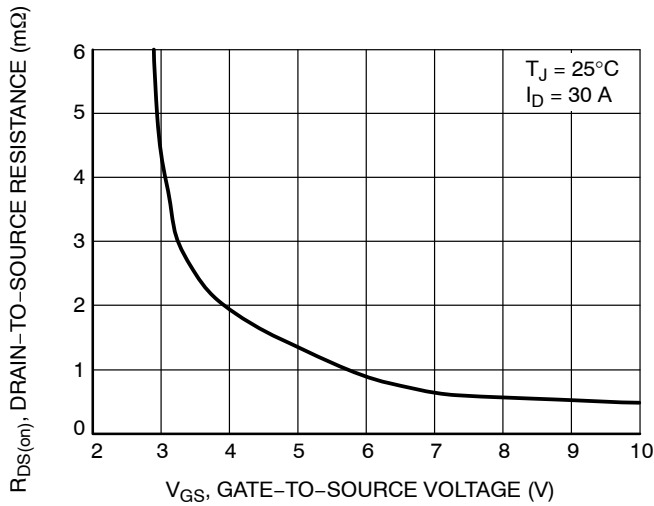


Figure 3. On-Resistance vs. Gate-to-Source Voltage

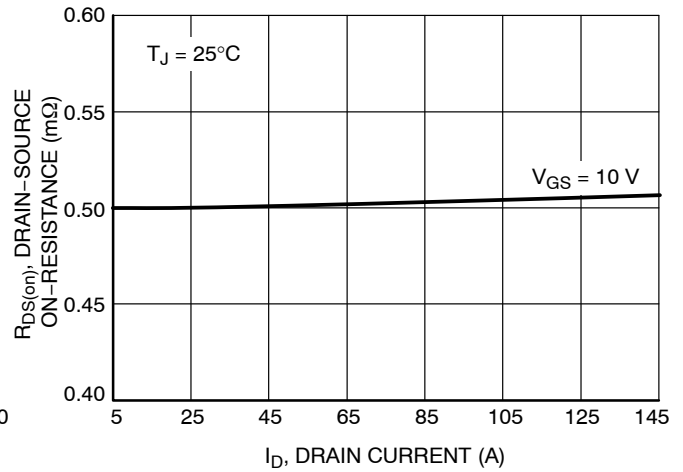


Figure 4. On-Resistance vs. Drain Current

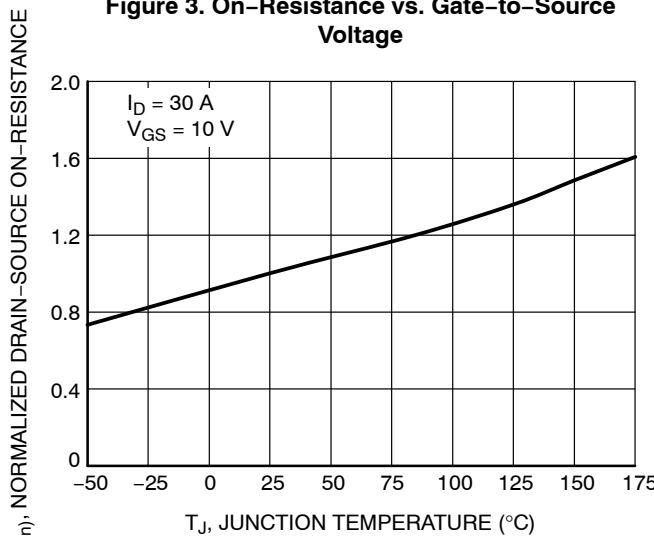


Figure 5. On-Resistance Variation with Temperature

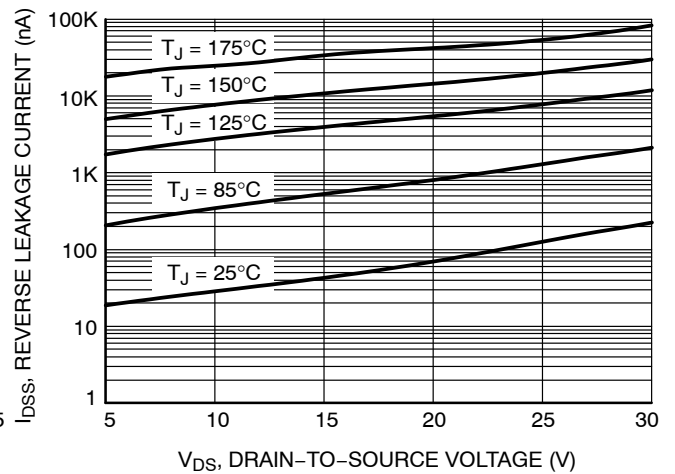


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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## TYPICAL CHARACTERISTICS

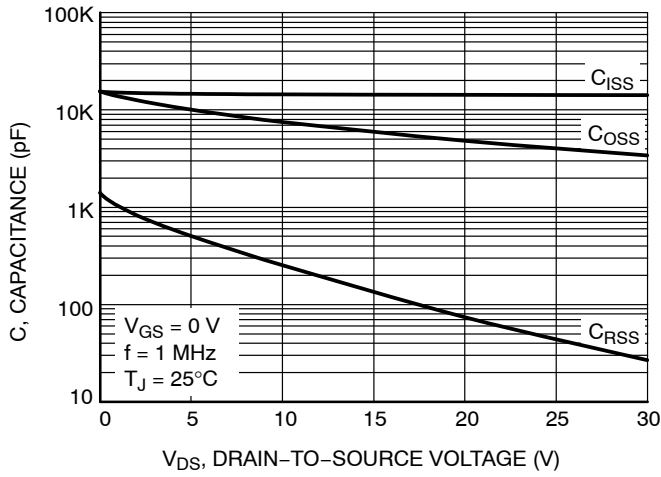


Figure 7. Capacitance Variation

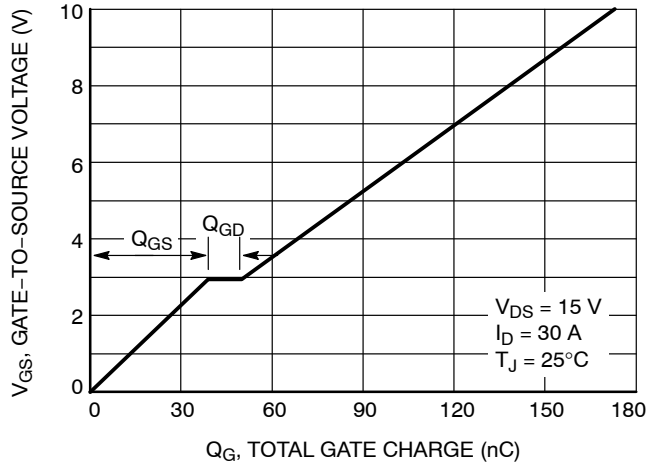


Figure 8. Gate-to-Source Voltage vs. Total Charge

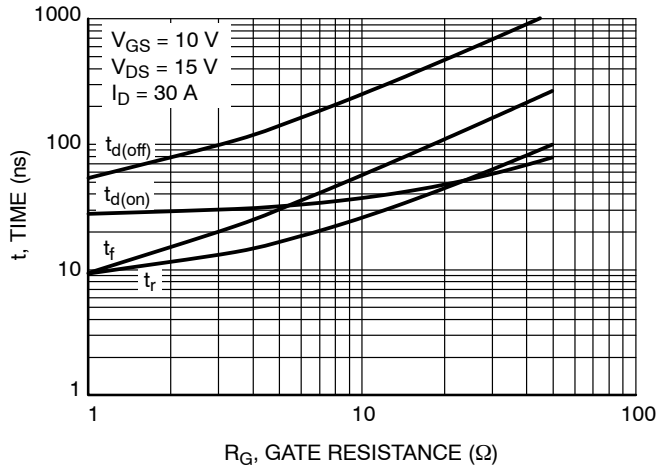


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

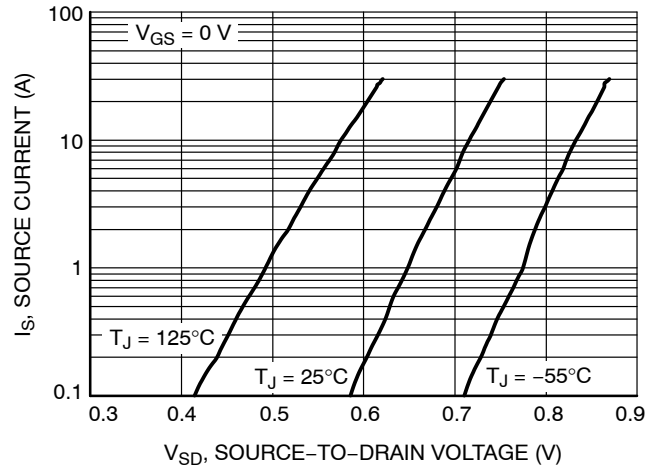


Figure 10. Diode Forward Voltage vs. Current

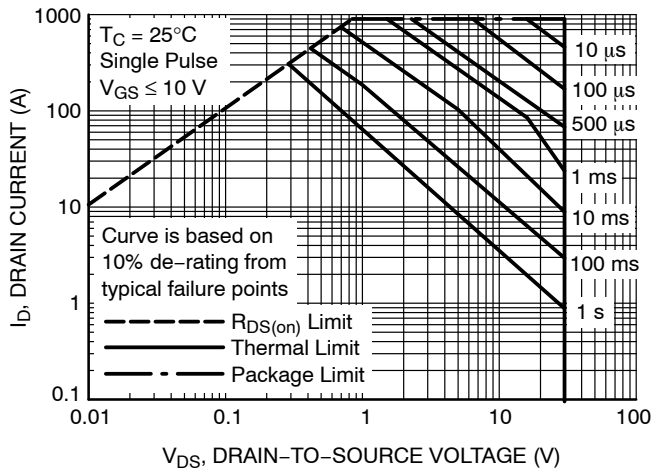


Figure 11. Safe Operating Area

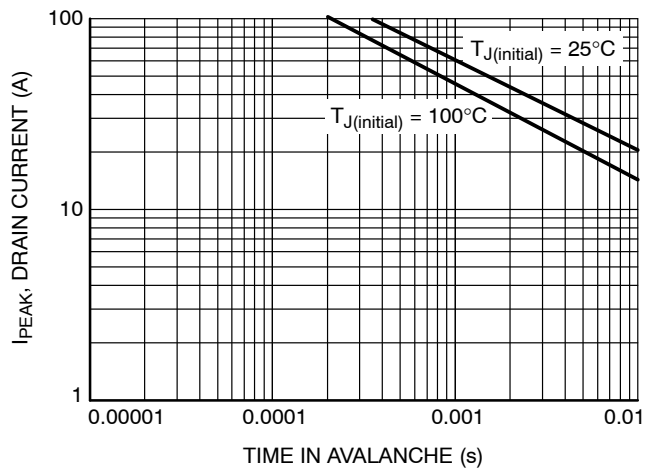


Figure 12. Maximum Drain Current vs. Time in Avalanche

# NTMFS0D55N03CG

## TYPICAL CHARACTERISTICS

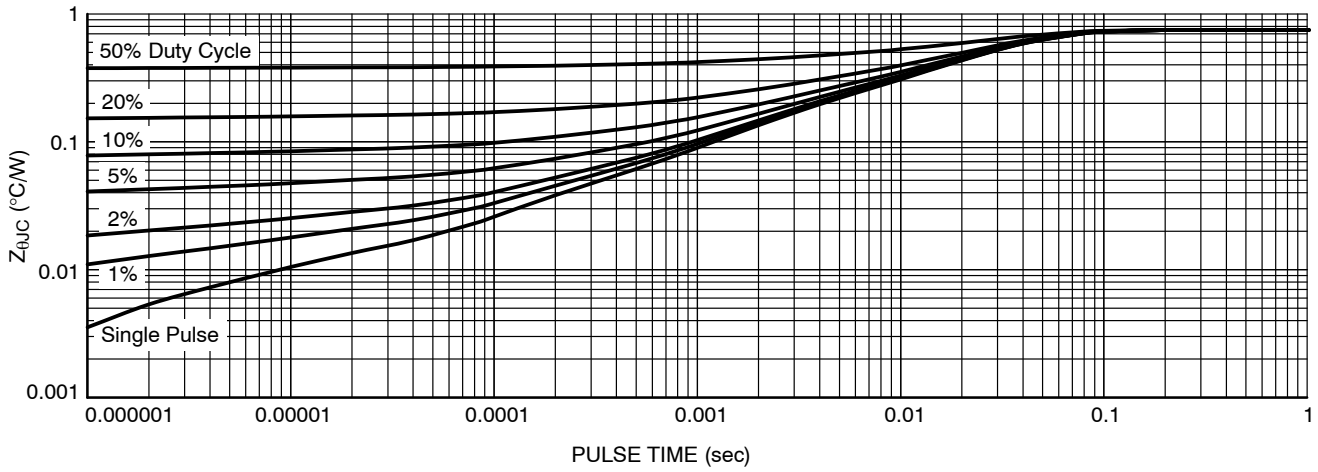


Figure 13. Junction-to-Case Transient Thermal Response

### DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
NTMFS0D55N03CGT1G	0D55NG	DFN5 (Pb-Free)	1500 / Tape & Reel

<sup>†</sup>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.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

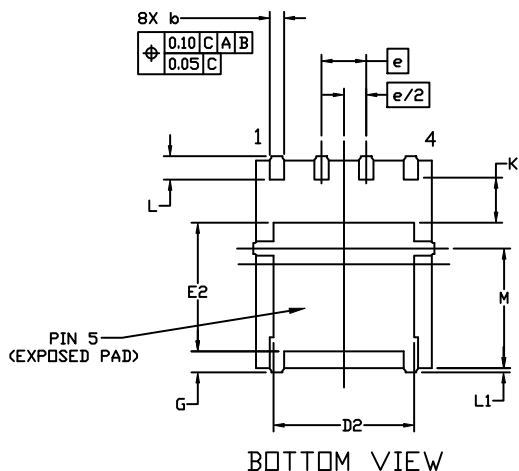
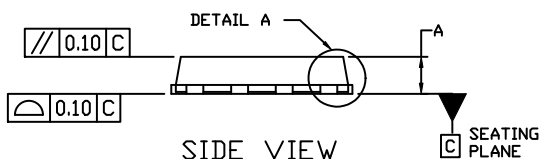
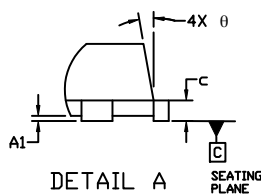
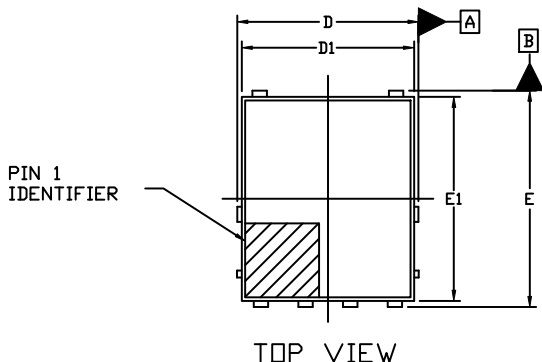
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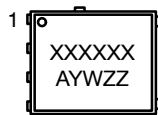
1  
SCALE 2:1

DFN5 5x6, 1.27P (SO-8FL)  
CASE 506EZ  
ISSUE A

DATE 25 AUG 2021



### GENERIC MARKING DIAGRAM\*

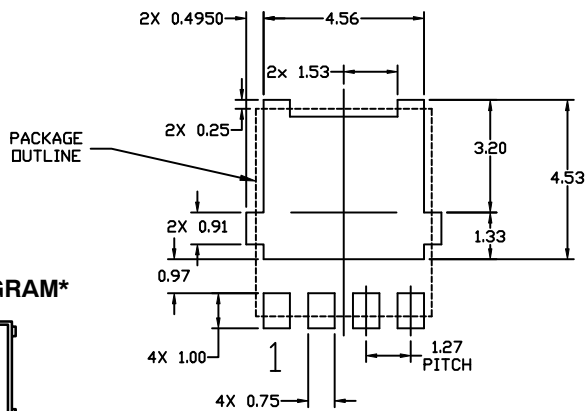


XXXXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
W = Work Week  
ZZ = Lot Traceability

\*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.

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
  2. CONTROLLING DIMENSION: MILLIMETERS
  3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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°



### RECOMMENDED MOUNTING FOOTPRINT

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

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DESCRIPTION:	DFN5 5x6, 1.27P (SO-8FL)	PAGE 1 OF 1

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