

MOSFET – Power, Dual N-Channel, DUAL SO8FL

60 V, 27 A, 20.3 mΩ

NTMFD020N06C

Features

- Small Footprint (5x6 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Power Tools, Battery Operated Vacuums
- UAV/Drones, Material Handling
- BMS/Storage, Home Automation

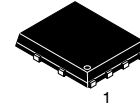
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise stated)

Symbol	Parameter			Value	Units
V _{DSS}	Drain-to-Source Voltage			60	V
V _{GS}	Gate-to-Source Voltage			±20	V
I _D	Continuous Drain Current R _{θJC} (Notes 1, 3)	Steady State	T _C = 25°C	27	A
			T _C = 100°C	19	
P _D	Power Dissipation R _{θJC} (Note 1)	Steady State	T _C = 25°C	31	W
			T _C = 100°C	15	
I _D	Continuous Drain Current R _{θJA} (Notes 1, 2, 3)	Steady State	T _A = 25°C	8	A
			T _A = 100°C	6	
P _D	Power Dissipation R _{θJA} (Notes 1, 2)	Steady State	T _A = 25°C	3.1	W
			T _A = 100°C	1.5	
I _{DM}	Pulsed Drain Current	T _A = 25°C, t _p = 10 μs		98	A
T _J , T _{stg}	Operating Junction and Storage Temperature Range			-55 to +175	°C
I _S	Source Current (Body Diode)			25	A
E _{AS}	Single Pulse Drain-to-Source Avalanche Energy (I _L = 5.7 A _{pk})			16	mJ
T _L	Lead Temperature Soldering Reflow for Soldering Purposes (1/8" from case for 10 s)			260	°C

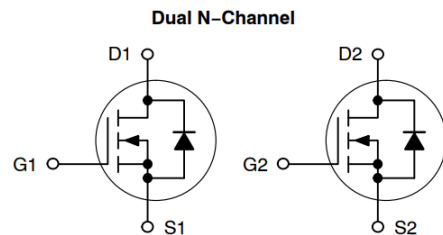
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

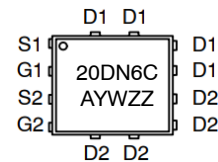
$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
60 V	20.3 mΩ @ 10 V	27 A



DFN8 5x6
(SO8FL)
CASE 506BT



MARKING DIAGRAM



20DN6C = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping†
NTMFD020N06CT1G	SO8FL Dual (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 Specification Brochure, [BRD8011/D](#).

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THERMAL RESISTANCE RATINGS

Symbol	Parameter	Max	Unit
$R_{\theta JC}$	Junction-to-Case – Steady State (Note 2)	4.8	°C/W
$R_{\theta JA}$	Junction-to-Ambient – Steady State (Note 2)	47	

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
$V_{(BR)DSS} / T_J$	Drain-to-Source Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, ref to 25°C		29		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}$			10	μA
		$T_J = 125^\circ\text{C}$			250	
I_{GSS}	Gate-to-Source Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$			100	nA

ON CHARACTERISTICS (Note 3)

$V_{GS(TH)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 20\text{ }\mu\text{A}$	2.0		4.0	V
$V_{GS(TH)} / T_J$	Negative Threshold Temperature Coefficient	$I_D = 20\text{ }\mu\text{A}$, ref to 25°C		-7.8		mV/°C
$R_{DS(on)}$	Drain-to-Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 4\text{ A}$		16.9	20.3	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = 5\text{ V}, I_D = 4\text{ A}$		12		S
R_G	Gate Resistance	$T_A = 25^\circ\text{C}$		1.0		Ω

CHARGES & CAPACITANCES

C_{ISS}	Input Capacitance	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 30\text{ V}$		355		pF
C_{OSS}	Output Capacitance			260		
C_{RSS}	Reverse Capacitance			4.9		
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 30\text{ V}, I_D = 4\text{ A}$		5.8		nC
$Q_{G(TH)}$	Threshold Gate Charge			1.4		
Q_{GS}	Gate-to-Source Charge			2.3		
Q_{GD}	Gate-to-Drain Charge			0.53		

SWITCHING CHARACTERISTICS (Note 3)

$t_{d(ON)}$	Turn-On Delay Time	$V_{GS} = 10\text{ V}, V_{DS} = 30\text{ V}, I_D = 4\text{ A}, R_G = 6\text{ }\Omega$		6.5		ns
t_r	Rise Time			1.4		
$t_{d(OFF)}$	Turn-Off Delay Time			9.7		
t_f	Fall Time			4.0		

DRAIN-SOURCE DIODE CHARACTERISTICS

V_{SD}	Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 4\text{ A}$	$T_J = 25^\circ\text{C}$		0.81	1.2	V
			$T_J = 125^\circ\text{C}$		0.67		
t_{RR}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, I_S = 4\text{ A}$			24		ns
t_a	Charge Time				12		
t_b	Discharge Time				12		
Q_{RR}	Reverse Recovery Charge				12		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

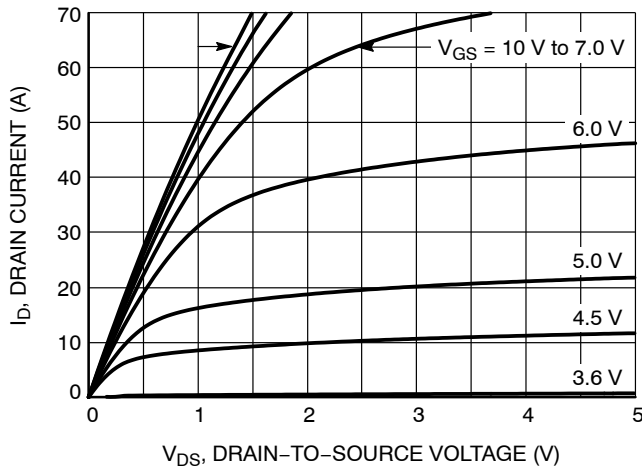


Figure 1. On-Region Characteristics

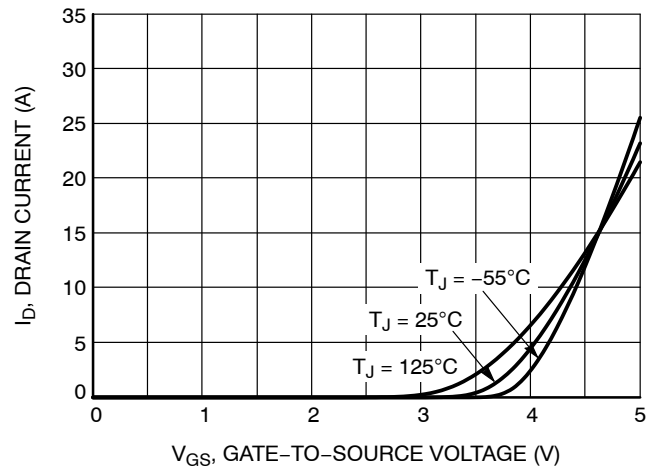


Figure 2. Transfer Characteristics

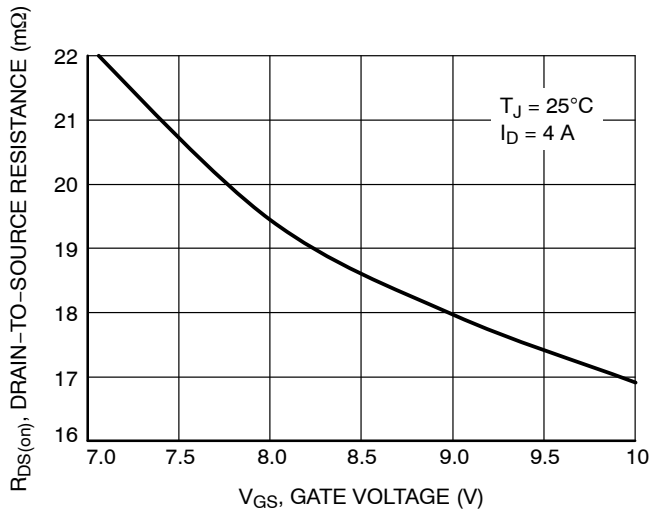


Figure 3. On-Resistance vs. Gate-to-Source Voltage

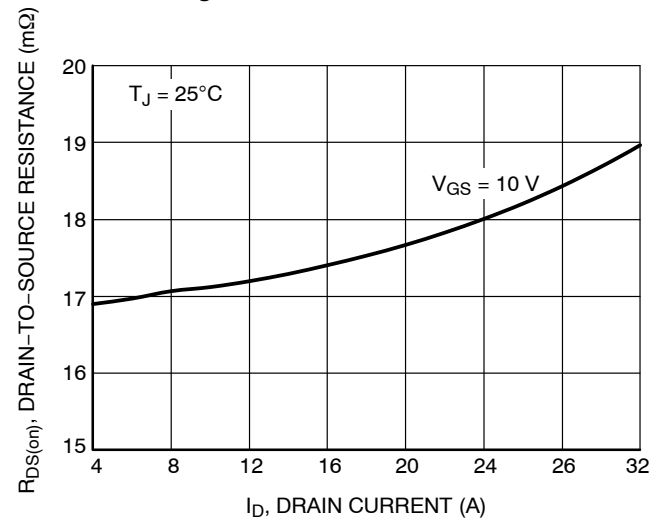


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

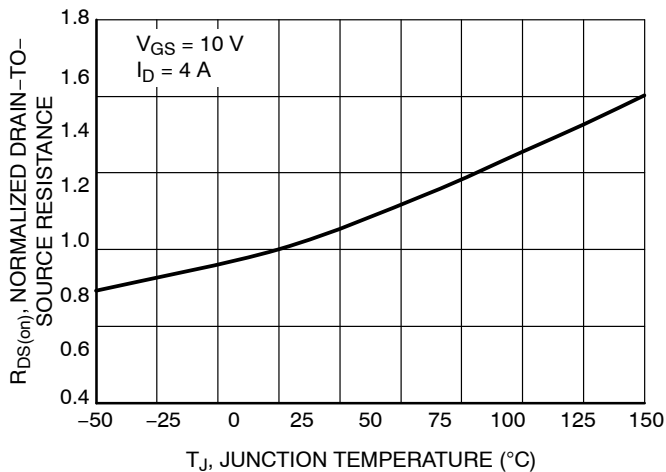


Figure 5. On-Resistance Variation with Temperature

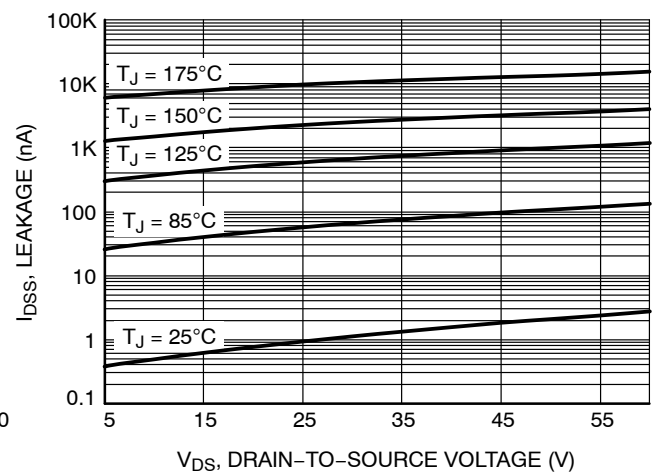


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

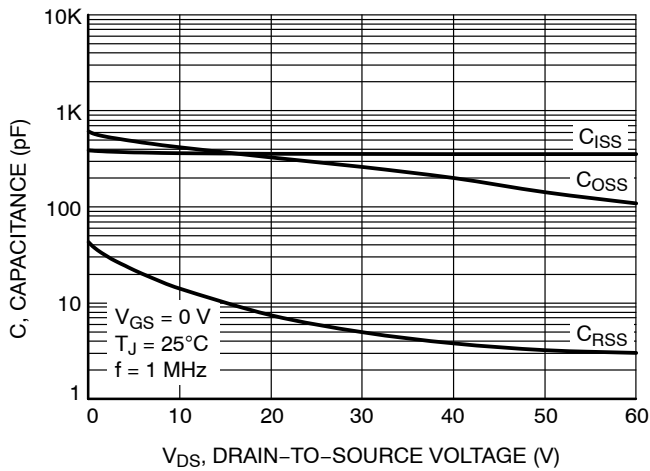


Figure 7. Capacitance Variation

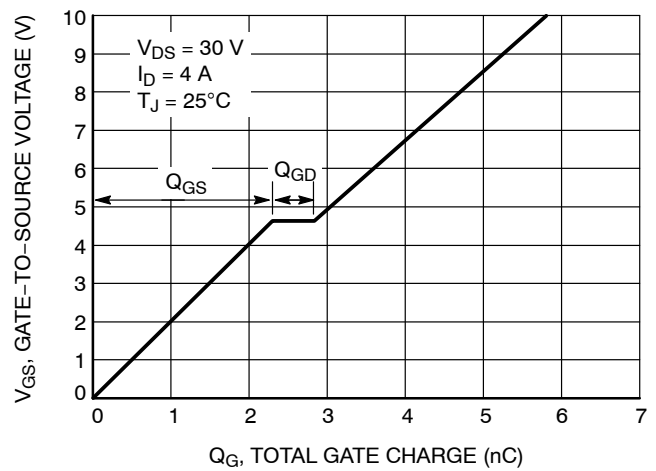


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

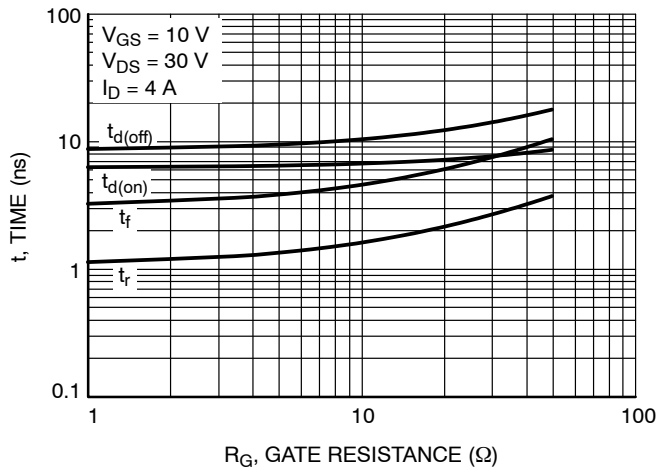


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

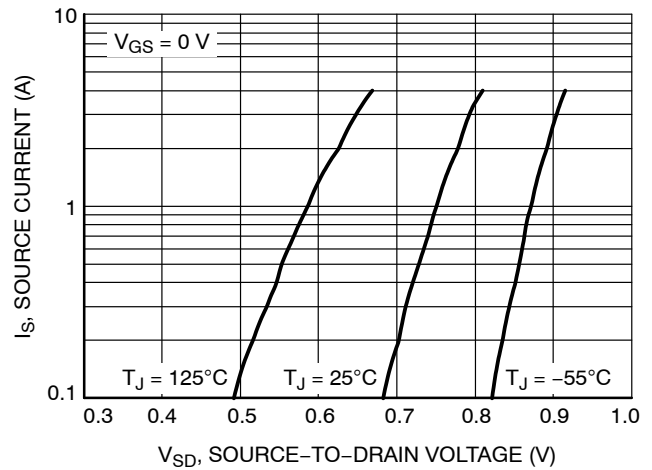


Figure 10. Diode Forward Voltage vs. Current

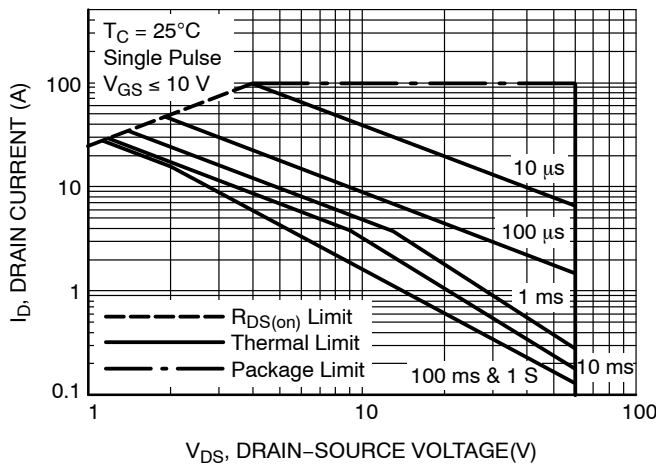


Figure 11. Safe Operating Area

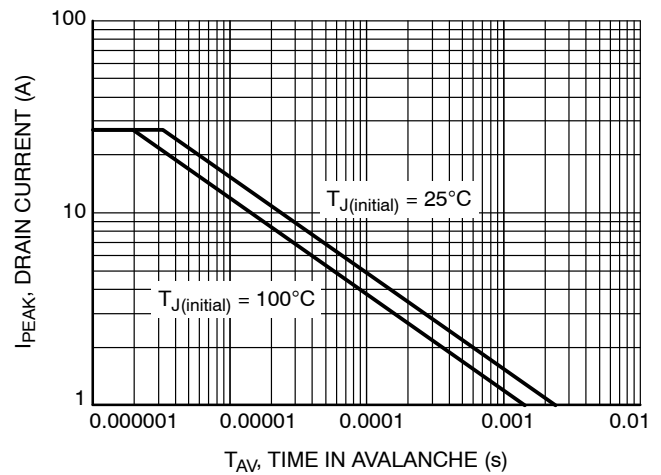


Figure 12. I_{PEAK} vs. Time in Avalanche

NTMFD020N06C

TYPICAL CHARACTERISTICS (continued)

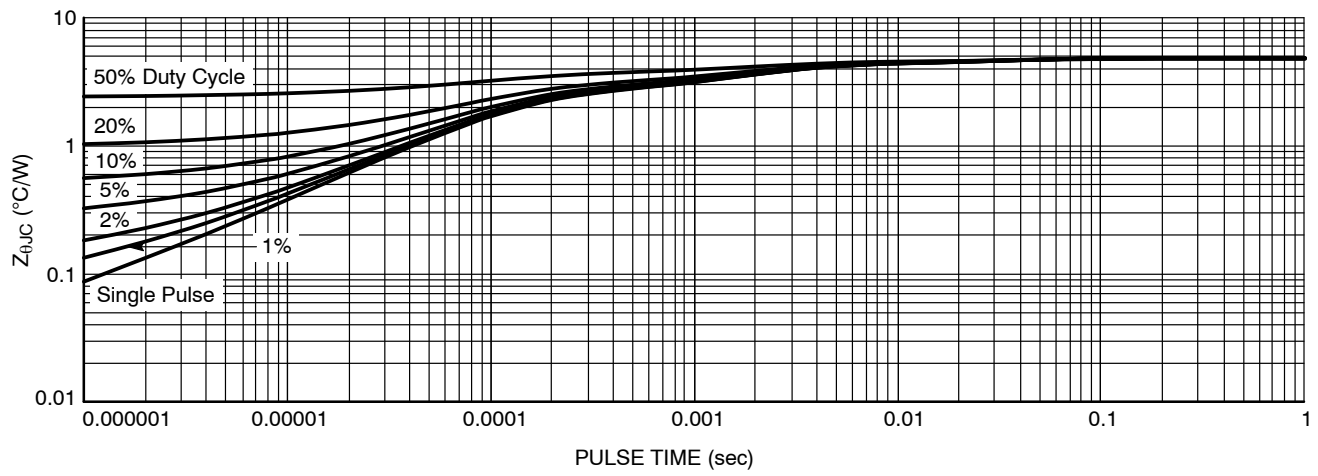
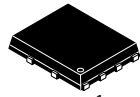


Figure 13. Thermal Response



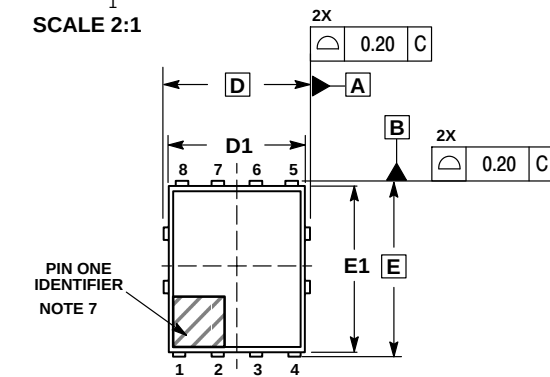
SCALE 2:1

DFN8 5x6, 1.27P Dual Flag (SO8FL-Dual)
CASE 506BT
ISSUE F

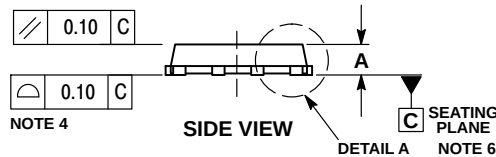
DATE 23 NOV 2021

NOTES:

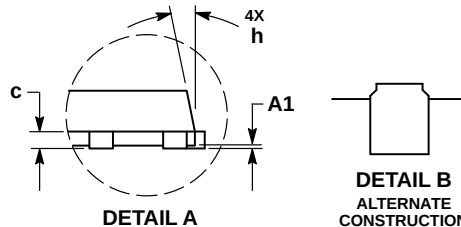
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM THE TERMINAL TIP.
4. PROFILE TOLERANCE APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
6. SEATING PLANE IS DEFINED BY THE TERMINALS. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY.
7. A VISUAL INDICATOR FOR PIN 1 MUST BE LOCATED IN THIS AREA.



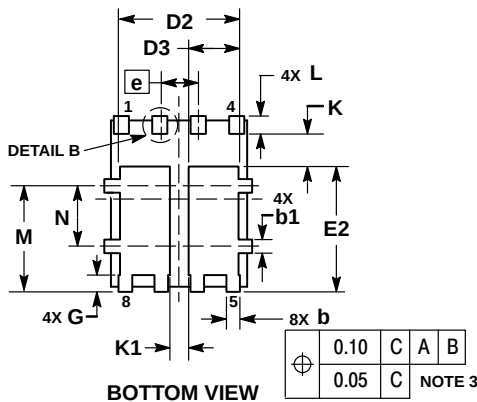
TOP VIEW



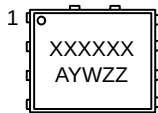
SIDE VIEW



DETAIL A

DETAIL B
ALTERNATE
CONSTRUCTION


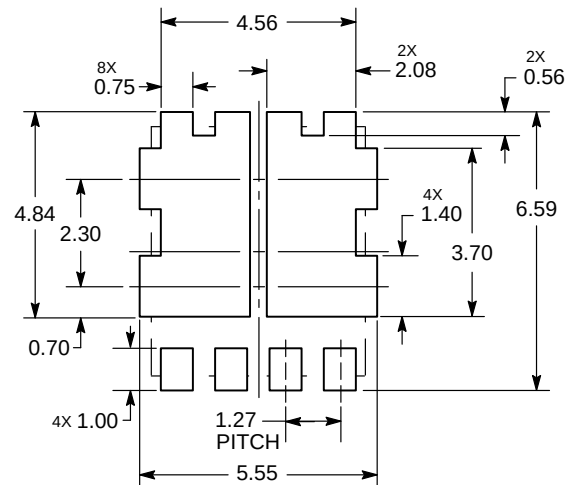
BOTTOM VIEW

**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.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	---	1.10
A1	---	---	0.05
b	0.33	0.42	0.51
b1	0.33	0.42	0.51
c	0.20	---	0.33
D	5.15 BSC		
D1	4.70	4.90	5.10
D2	3.90	4.10	4.30
D3	1.50	1.70	1.90
E	6.15 BSC		
E1	5.70	5.90	6.10
E2	3.90	4.15	4.40
e	1.27 BSC		
G	0.45	0.55	0.65
h	---	---	12 °
K	0.51	---	---
K1	0.56	---	---
L	0.48	0.61	0.71
M	3.25	3.50	3.75
N	1.80	2.00	2.20

SOLDERING FOOTPRINT*


DIMENSION: MILLIMETERS

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

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DESCRIPTION:	DFN8 5X6, 1.27P DUAL FLAG (SO8FL-DUAL)	PAGE 1 OF 1

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