

MOSFET – Power, Dual N-Channel

60 V, 11.9 mΩ, 40 A

NVMFD5C672NL

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
- NVMFD5C672NLWF – Wettable Flank Option for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-to-Source Voltage	60	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D	Continuous Drain Current $R_{\theta JC}$ (Notes 1, 2, 3)	$T_C = 25^\circ\text{C}$	40
		$T_C = 100^\circ\text{C}$	31
		$T_C = 25^\circ\text{C}$	42
P_D	Power Dissipation $R_{\theta JC}$ (Notes 1, 2)	$T_C = 25^\circ\text{C}$	42
		$T_C = 100^\circ\text{C}$	21
		$T_C = 25^\circ\text{C}$	42
I_D	Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	$T_A = 25^\circ\text{C}$	11
		$T_A = 100^\circ\text{C}$	8.0
		$T_A = 25^\circ\text{C}$	3.1
P_D	Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	$T_A = 25^\circ\text{C}$	3.1
		$T_A = 100^\circ\text{C}$	1.5
		$T_A = 25^\circ\text{C}$	3.1
I_{DM}	Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	161
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
I_S	Source Current (Body Diode)	35.2	A
E_{AS}	Single Pulse Drain-to-Source Avalanche Energy ($T_J = 25^\circ\text{C}, I_{L(pk)} = 2 \text{ A}$)	66	mJ
T_L	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	260	$^\circ\text{C}$

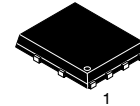
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction-to-Case – Steady State	3.55	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient – Steady State (Note 2)	47.51	

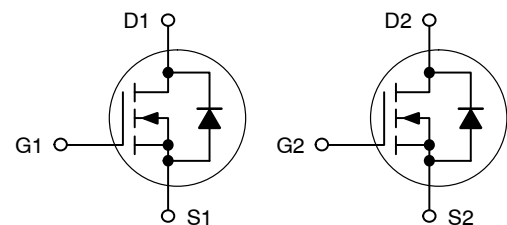
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent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

$V_{(BR)DS}$	$R_{DS(on)}$ MAX	I_D MAX
60 V	11.9 mΩ @ 10 V	40 A
	16.8 mΩ @ 4.5 V	

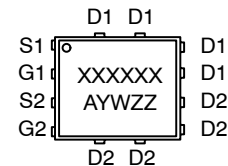


DFN8 5x6
(SO8FL)
CASE 506BT

Dual N-Channel



MARKING DIAGRAM



- 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.

NVMFD5C672NL

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			27		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}$	$T_J = 25^\circ\text{C}$		10	μA
			$T_J = 125^\circ\text{C}$		100	
I_{GSS}	Gate-to-Source Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$			100	nA

ON CHARACTERISTICS (Note 4)

$V_{GS(TH)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 30\text{ }\mu\text{A}$	1.2		2.2	V
$V_{GS(TH)}/T_J$	Negative Threshold Temperature Coefficient			-5.7		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Drain-to-Source On Resistance	$V_{GS} = 10\text{ V}$	$I_D = 10\text{ A}$	9.8	11.9	m Ω
		$V_{GS} = 4.5\text{ V}$	$I_D = 10\text{ A}$	13.4	16.8	
g_{FS}	Forward Transconductance	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$		27.5		S

CHARGES, CAPACITANCES

C_{ISS}	Input Capacitance	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 25\text{ V}$		793		pF
C_{OSS}	Output Capacitance			383		
C_{RSS}	Reverse Transfer Capacitance			9.0		
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = 4.5\text{ V}, V_{DS} = 48\text{ V}; I_D = 10\text{ A}$		5.7		nC
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 48\text{ V}; I_D = 10\text{ A}$		12.3		
$Q_{G(TH)}$	Threshold Gate Charge	$V_{DS} = 48\text{ V}; I_D = 10\text{ A}$		1.5		
Q_{GS}	Gate-to-Source Charge			2.7		
Q_{GD}	Gate-to-Drain Charge			1.2		
V_{GP}	Plateau Voltage			2.8		V

SWITCHING CHARACTERISTICS (Note 5)

$t_{d(ON)}$	Turn-On Delay Time	$V_{GS} = 4.5\text{ V}, V_{DS} = 48\text{ V}, I_D = 10\text{ A}, R_G = 1.0\text{ }\Omega$		11		ns
t_r	Rise Time			30		
$t_{d(OFF)}$	Turn-Off Delay Time			22		
t_f	Fall Time			28		

DRAIN-SOURCE DIODE CHARACTERISTICS

V _{SD}	Forward Diode Voltage	V _{GS} = 0 V, I _S = 10 A	T _J = 25°C		0.9	1.2	V
			T _J = 125°C		0.8		
t _{RR}	Reverse Recovery Time	V _{GS} = 0 V, dI _S /dt = 20 A/μs, I _S = 10 A			26		ns
t _a	Charge Time				12.3		
t _b	Discharge Time				13.5		
Q _{RR}	Reverse Recovery Charge					13	

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 $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperatures.



TYPICAL CHARACTERISTICS

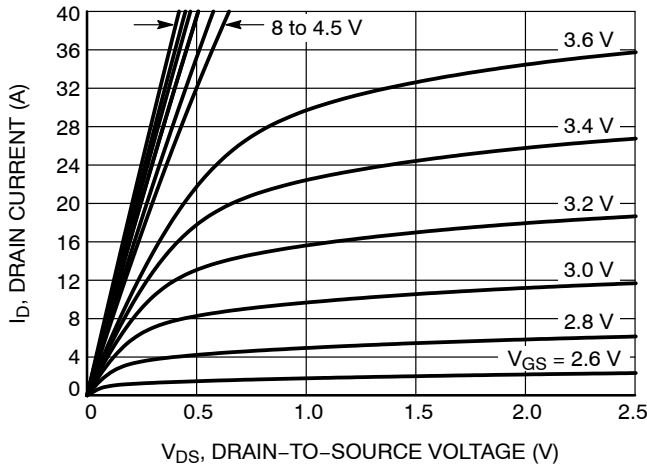


Figure 1. On-Region Characteristics

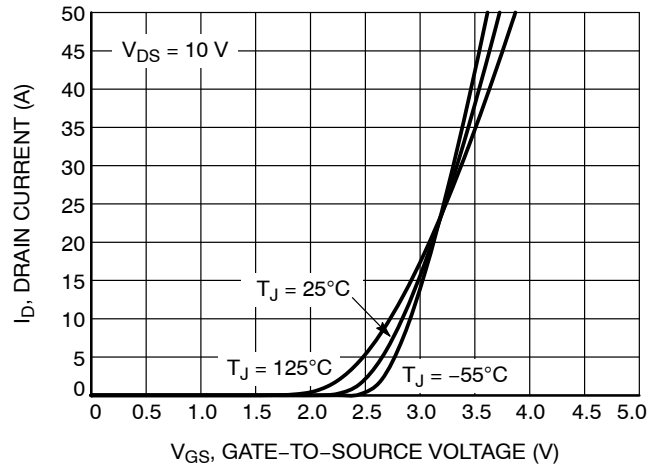


Figure 2. Transfer Characteristics

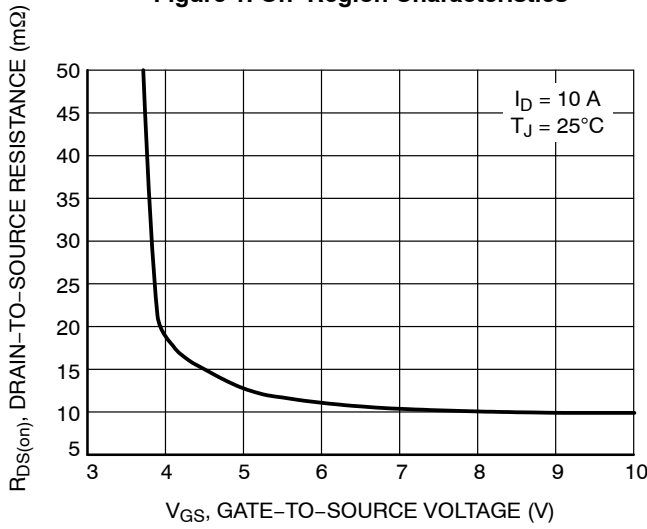


Figure 3. On-Resistance vs. Gate-to-Source Voltage

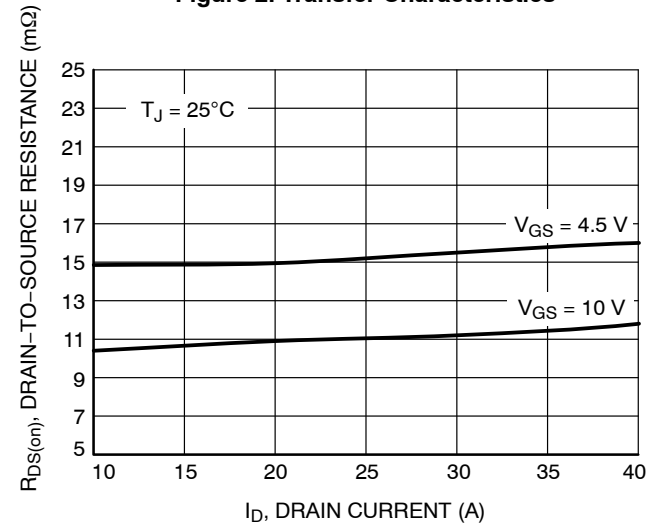


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

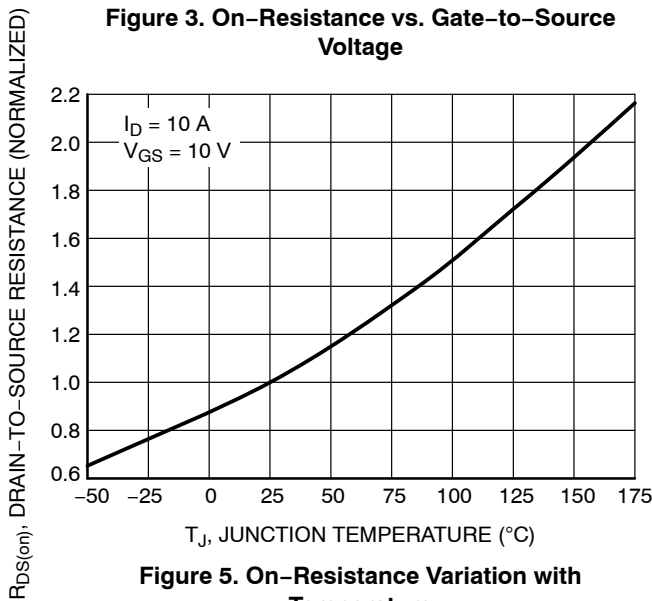


Figure 5. On-Resistance Variation with Temperature

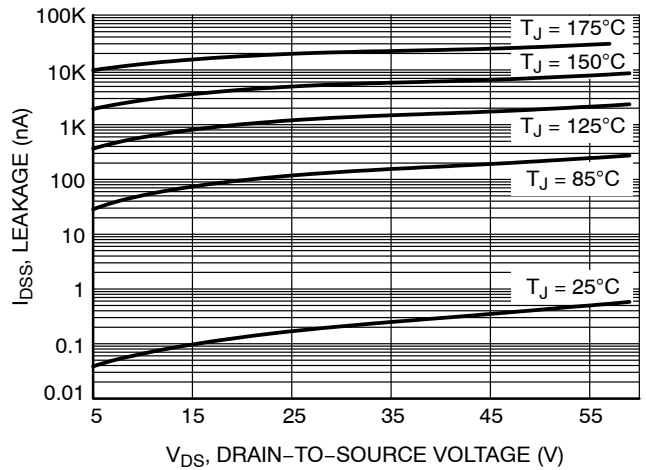


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

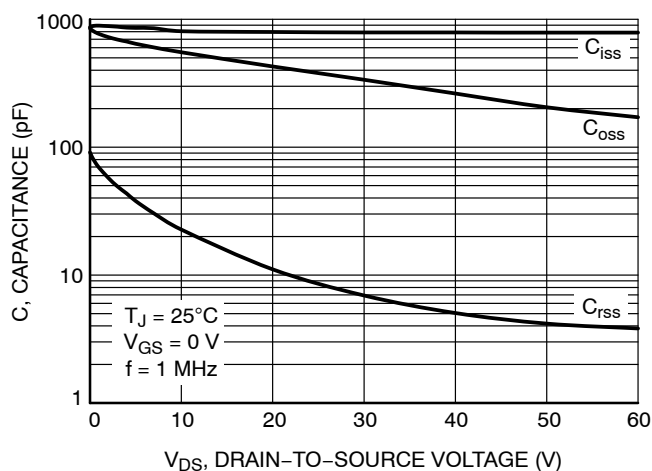


Figure 7. Capacitance Variation

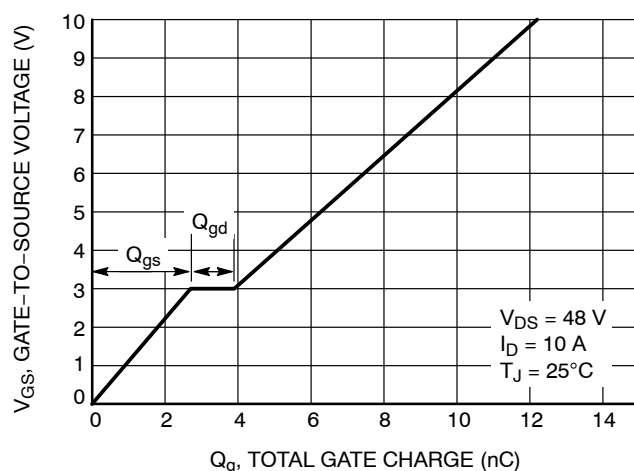


Figure 8. Gate-to-Source vs. Total Charge

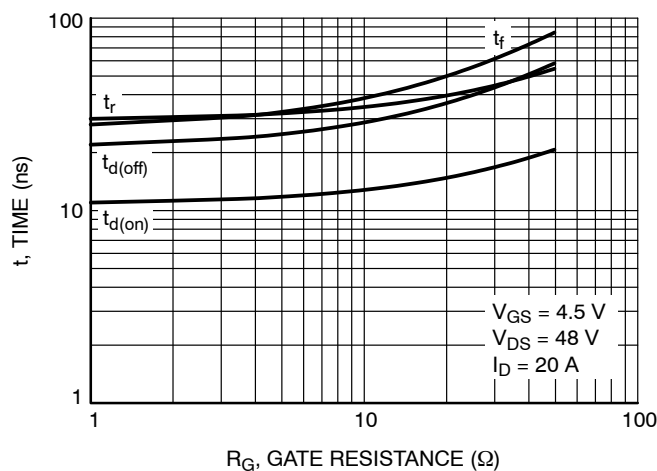


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

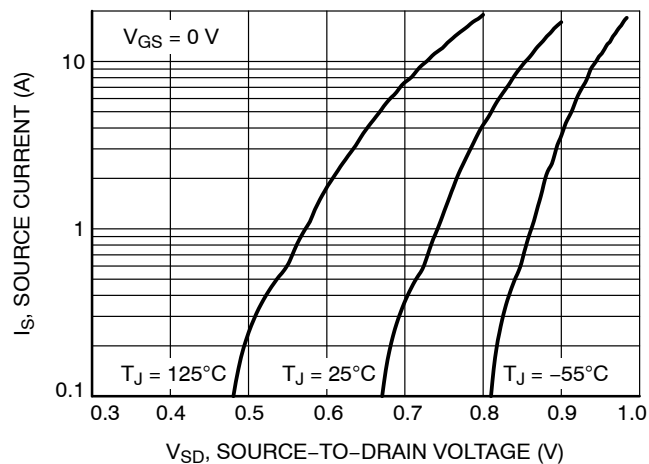


Figure 10. Diode Forward Voltage vs. Current

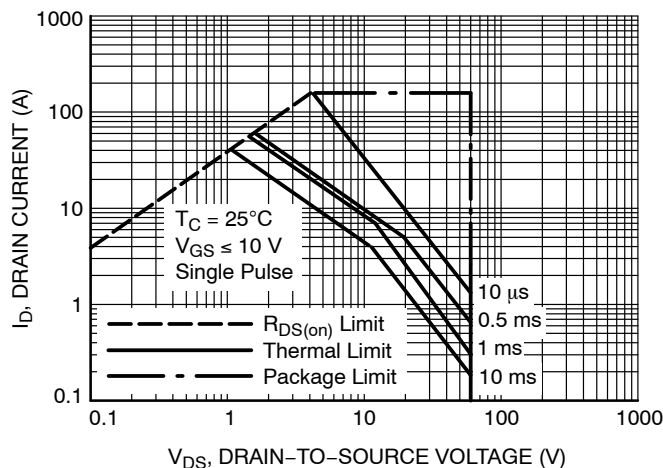


Figure 11. Maximum Rated Forward Biased Safe Operating Area

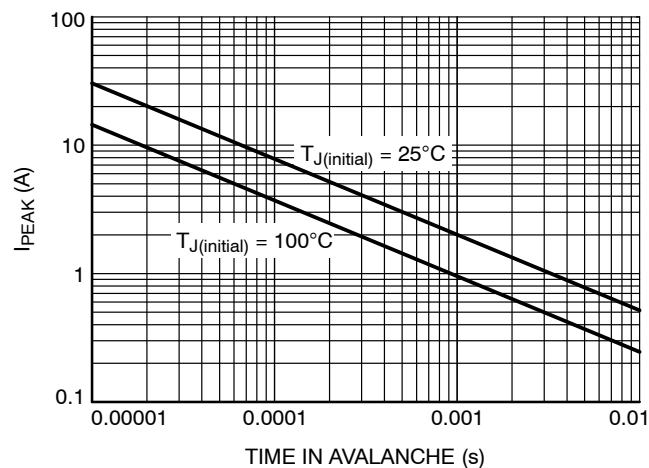


Figure 12. Maximum Drain Current vs. Time in Avalanche

NVMFD5C672NL

TYPICAL CHARACTERISTICS (continued)

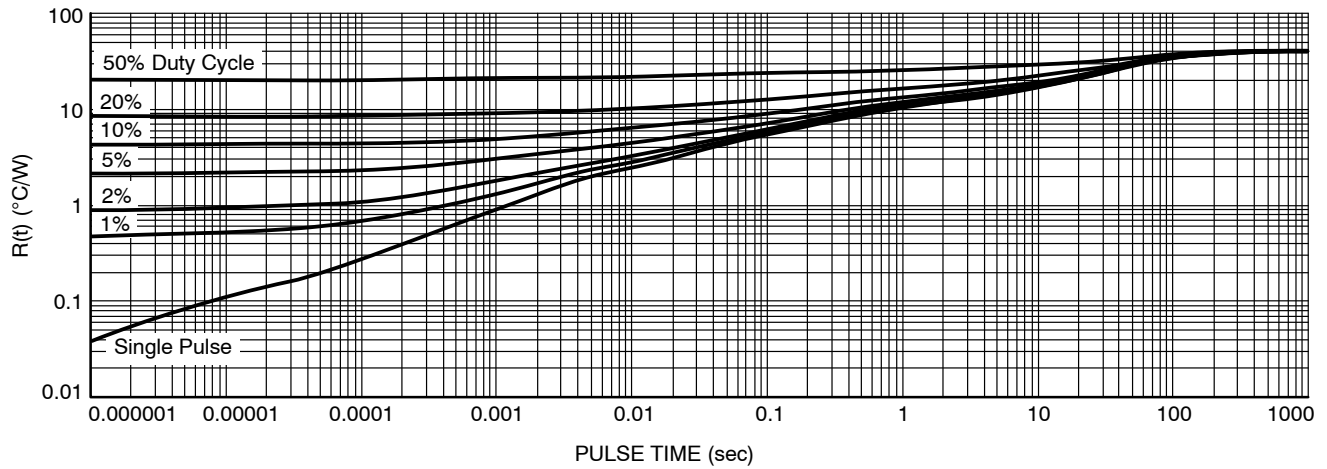


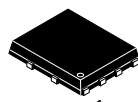
Figure 13. Thermal Response

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping†
NVMFD5C672NLT1G	5C672L	DFN8 (Pb-Free)	1,500 / Tape & Reel
NVMFD5C672NLWFT1G	672LWF	DFN8 (Pb-Free, Wettable Flanks)	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](#).





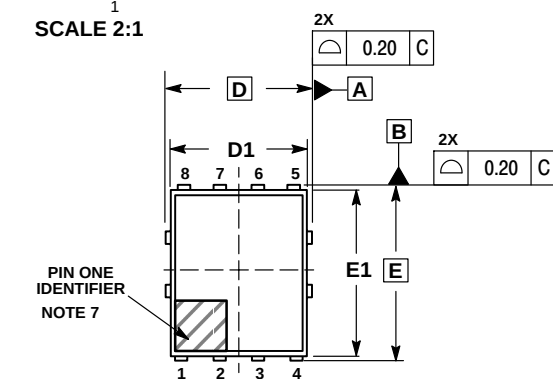
DFN8 5x6, 1.27P Dual Flag (SO8FL-Dual)

CASE 506BT

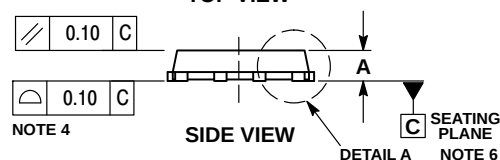
ISSUE F

DATE 23 NOV 2021

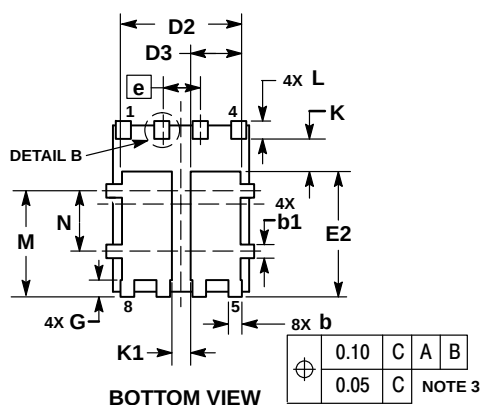
SCALE 2:1



TOP VIEW

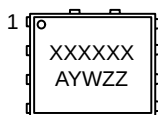


SIDE VIEW



BOTTOM VIEW

GENERIC MARKING DIAGRAM*



XXXXXX = Specific Device Code

A = Assembly Location

Y = Year

W = Work Week

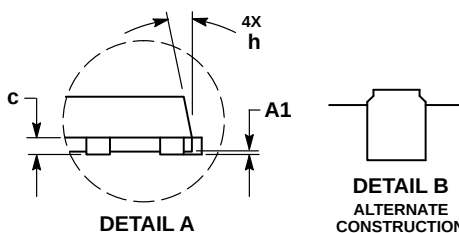
ZZ = Lot Traceability

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

NOTES:

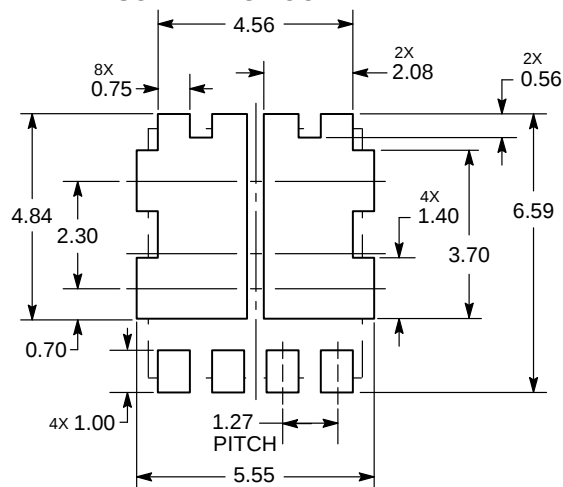
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM THE TERMINAL TIP.
4. PROFILE TOLERANCE APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO 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.

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



DETAIL B
ALTERNATE
CONSTRUCTION

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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