

MOSFET - Power, Dual N-Channel, Logic Level, Dual SO8FL

60 V, 39 mΩ, 17 A

NVMFD5877NL

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- NVMFD5877NLWF – Wettable Flanks Option for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant

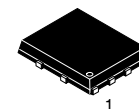
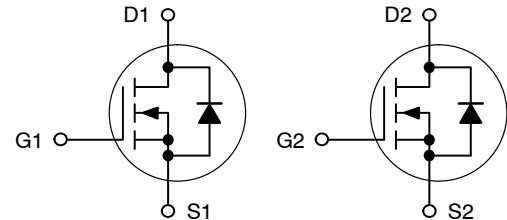
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter			Symbol	Value	Unit	
Drain-to-Source Voltage			V _{DSS}	60	V	
Gate-to-Source Voltage			V _{GS}	± 20	V	
Continuous Drain Current R _{ΨJ-mb} (Notes 1, 2, 3, 4)	Steady State	T _{mb} = 25 °C	I _D	17	A	
		T _{mb} = 100 °C		12		
		Power Dissipation R _{ΨJ-mb} (Notes 1, 2, 3)	T _{mb} = 25 °C	P _D	23	W
			T _{mb} = 100 °C		12	
Continuous Drain Current R _{θJA} (Notes 1 & 3, 4)	Steady State	T _A = 25 °C	I _D	6	A	
		T _A = 100 °C		5		
Power Dissipation R _{θJA} (Notes 1, 3)		T _A = 25 °C	P _D	3.2	W	
		T _A = 100°C		1.6		
Pulsed Drain Current	T _A = 25 °C, t _p = 10 μs		I _{DM}	74	A	
Operating Junction and Storage Temperature			T _J , T _{stg}	-55 to +175	°C	
Source Current (Body Diode)			I _S	19	A	
Single Pulse Drain-to-Source Avalanche Energy (T _J = 25°C, V _{DD} = 24 V, V _{GS} = 10 V, R _G = 25 Ω)	(I _{L(pk)} = 14.5 A, L = 0.1 mH)		E _{AS}	10.5	mJ	
	(I _{L(pk)} = 6.3 A, L = 2 mH)			40		
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T _L	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.

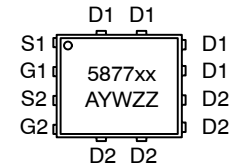
$V_{(BR)DSS}$	$R_{DS(on)} \text{ MAX}$	$I_D \text{ MAX}$
60 V	39 mΩ @ 10 V	17 A
	60 mΩ @ 4.5 V	

Dual N-Channel



DFN8 5x6
(SO8FL)
CASE 506BT

MARKING DIAGRAM



5877NL = Specific Device Code
for NVMFD5877NL

5877LW = Specific Device Code
for NVMFD5877NLWF

A = Assembly Location

Y = Year

W = Work Week

ZZ = Lot Traceability

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 6 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 6.

THERMAL RESISTANCE MAXIMUM RATINGS (Note 1)

Parameter	Symbol	Value	Unit
Junction-to-Mounting Board (top) – Steady State (Note 2, 3)	$R_{\Psi J-mb}$	6.5	°C/W
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	47	

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. Psi (Ψ) is used as required per JESD51-12 for packages in which substantially less than 100% of the heat flows to single case surface.
3. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
4. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

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	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			53		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	μA
			$T_J = 125^\circ\text{C}$		10	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 5)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	1.0		3.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.5		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 7.5\text{ A}$		31	39	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 7.5\text{ A}$		42	60	
Forward Transconductance	g_{FS}	$V_{DS} = 15\text{ V}, I_D = 5.0\text{ A}$		7.0		S

CHARGES AND CAPACITANCES

Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 25\text{ V}$		540		pF
Output Capacitance	C_{oss}			55		
Reverse Transfer Capacitance	C_{rss}			36		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 48\text{ V}, I_D = 5.0\text{ A}$		5.9		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.62		
Gate-to-Source Charge	Q_{GS}			1.64		
Gate-to-Drain Charge	Q_{GD}			2.80		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10\text{ V}, V_{DS} = 48\text{ V}, I_D = 5.0\text{ A}$		11	20	nC

SWITCHING CHARACTERISTICS (Note 6)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 48\text{ V}, I_D = 5.0\text{ A}, R_G = 2.5\text{ }\Omega$		8.1		ns
Rise Time	t_r			15.8		
Turn-Off Delay Time	$t_{d(off)}$			11.8		
Fall Time	t_f			3.9		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 48\text{ V}, I_D = 5.0\text{ A}, R_G = 2.5\text{ }\Omega$		4.9		ns
Rise Time	t_r			6.4		
Turn-Off Delay Time	$t_{d(off)}$			14.5		
Fall Time	t_f			2.4		

5. Pulse Test: pulse width = 300 μs , duty cycle $\leq 2\%$.
6. Switching characteristics are independent of operating junction temperatures.

NVMFD5877NL

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V},$ $I_S = 5.0\text{ A}$	$T_J = 25^\circ\text{C}$		0.8	1.2	V
			$T_J = 125^\circ\text{C}$		0.7		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s},$ $I_S = 5.0\text{ A}$			14.5		ns
Charge Time	t_a				11.5		
Discharge Time	t_b				3.1		
Reverse Recovery Charge	Q_{RR}				11		nC

PACKAGE PARASITIC VALUES

Source Inductance	L_S	$T_A = 25^\circ\text{C}$		0.93		nH
Drain Inductance	L_D			0.005		
Gate Inductance	L_G			1.84		
Gate Resistance	R_G			1.5		Ω

5. Pulse Test: pulse width = 300 μs , duty cycle $\leq 2\%$.

6. Switching characteristics are independent of operating junction temperatures.

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

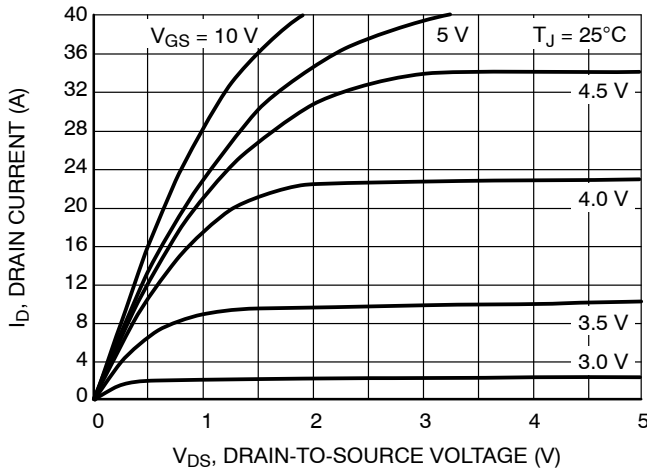


Figure 1. On-Region Characteristics

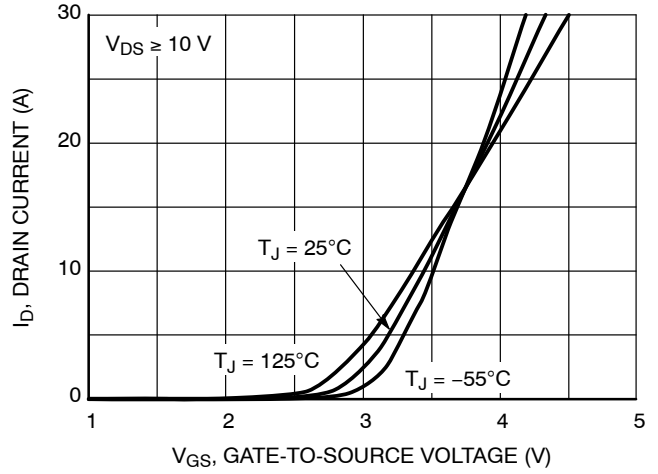


Figure 2. Transfer Characteristics

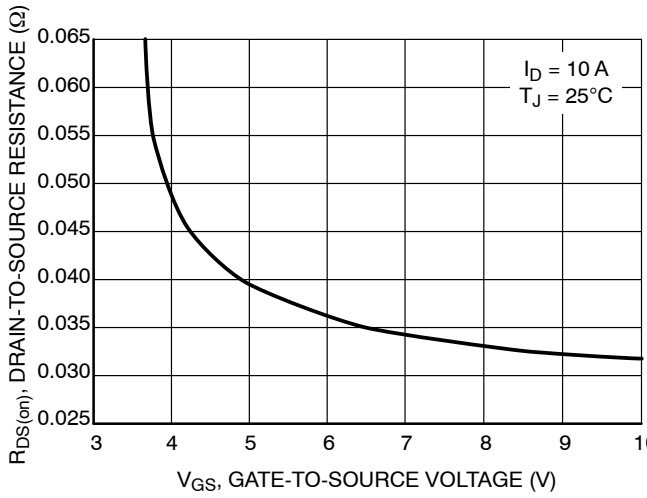


Figure 3. On-Resistance vs. Gate-to-Source Voltage

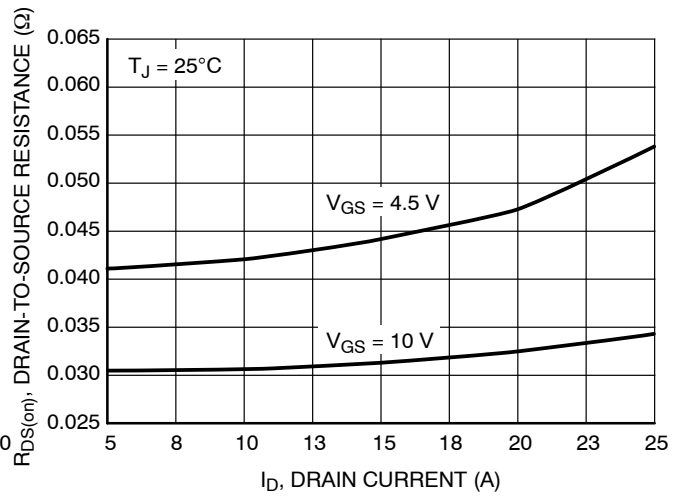


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

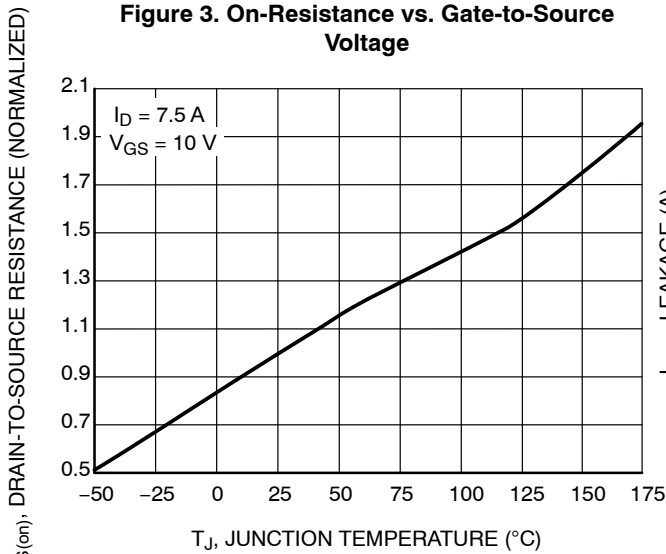


Figure 5. On-Resistance Variation with Temperature

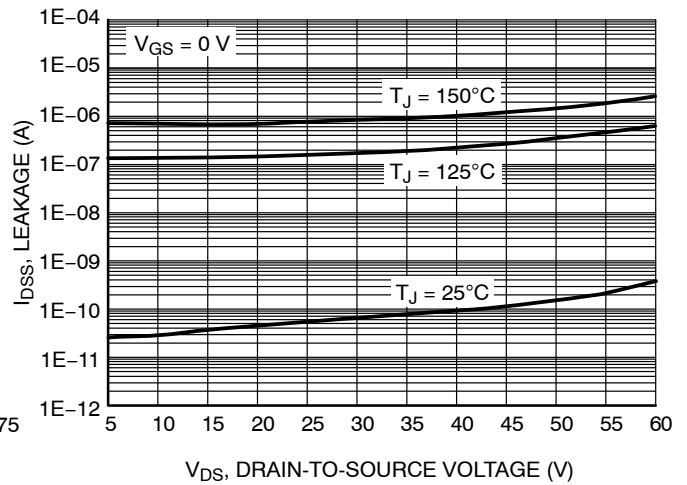


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

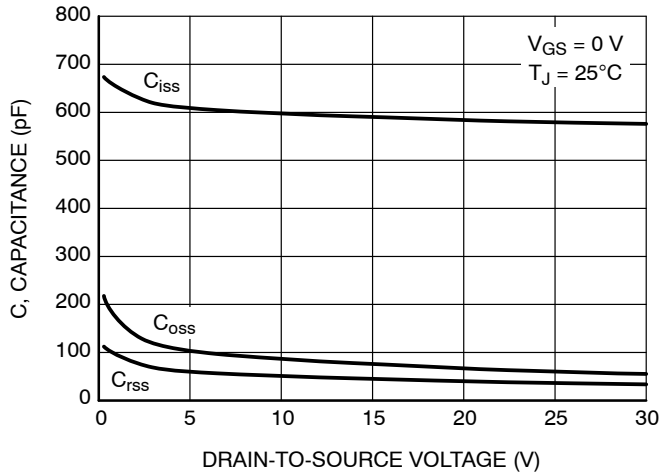


Figure 7. Capacitance Variation

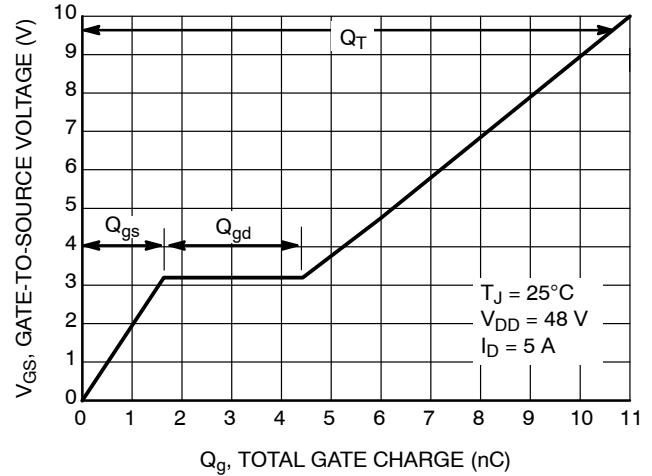


Figure 8. Gate-to-Source vs. Gate Charge

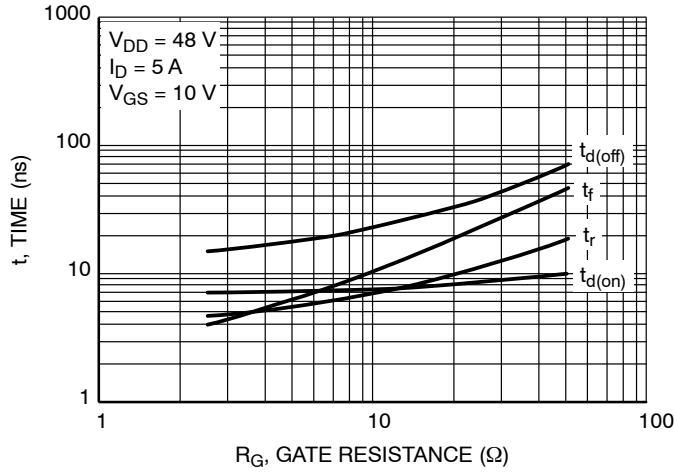


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

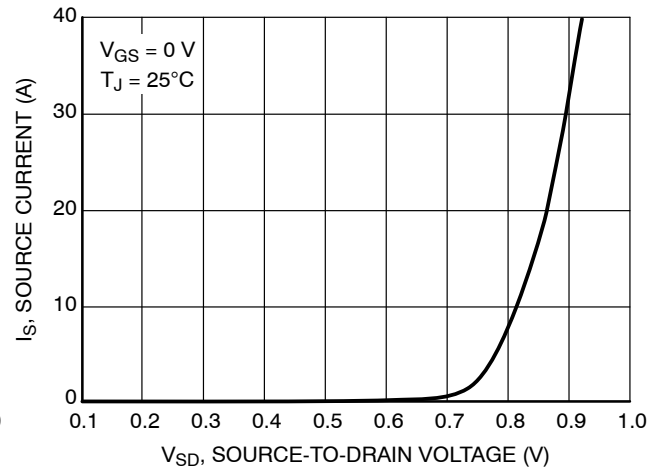


Figure 10. Diode Forward Voltage

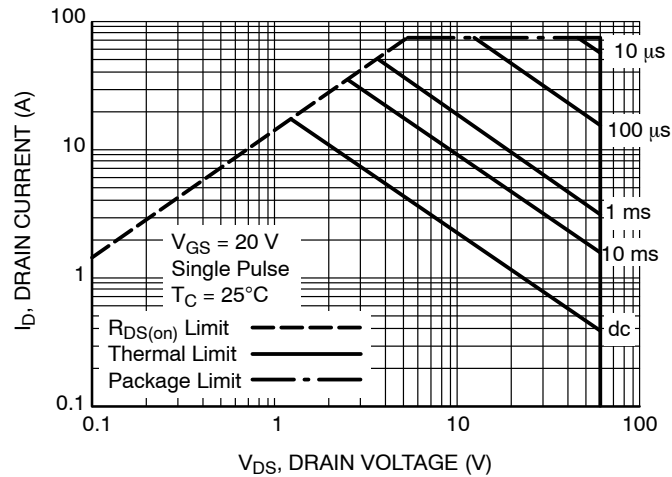


Figure 11. Maximum Rated Forward Biased Safe Operating Area

TYPICAL CHARACTERISTICS

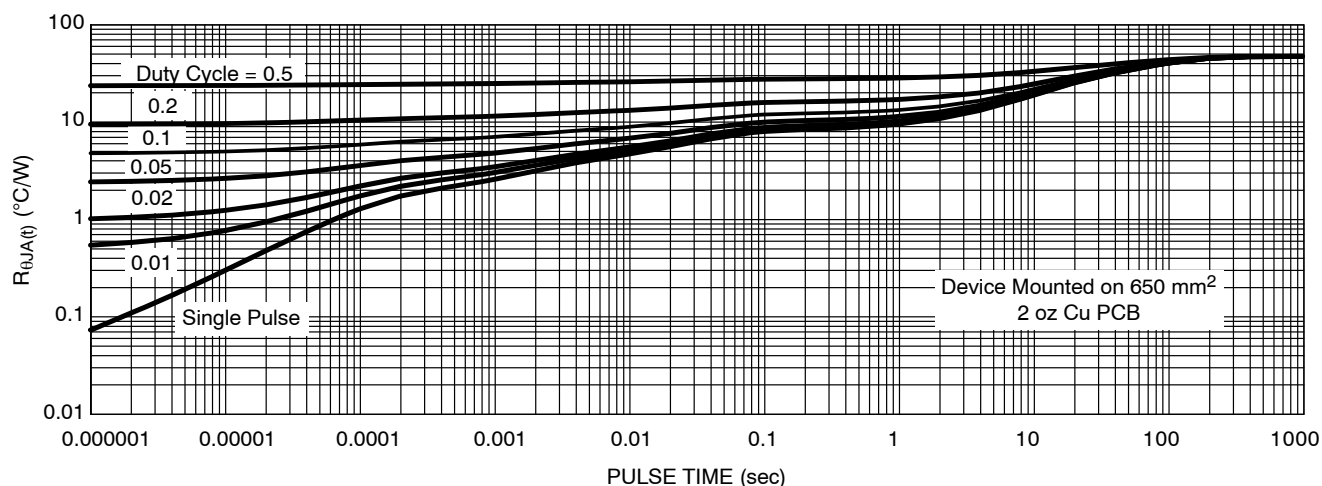


Figure 12. Thermal Response

DEVICE ORDERING INFORMATION

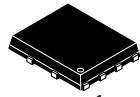
Device	Marking	Package	Shipping†
NVMFD5877NLWFT1G-UM	5877LW	DFN8 (Pb-Free)	1500 / Tape & Reel

DISCONTINUED (Note 7)

NVMFD5877NLT1G	5877NL	DFN8 (Pb-Free)	1500 / Tape & Reel
NVMFD5877NLWFT1G	5877LW	DFN8 (Pb-Free)	1500 / Tape & Reel
NVMFD5877NLT3G	5877NL	DFN8 (Pb-Free)	5000 / Tape & Reel
NVMFD5877NLWFT3G	5877LW	DFN8 (Pb-Free)	5000 / 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](#).

7. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.



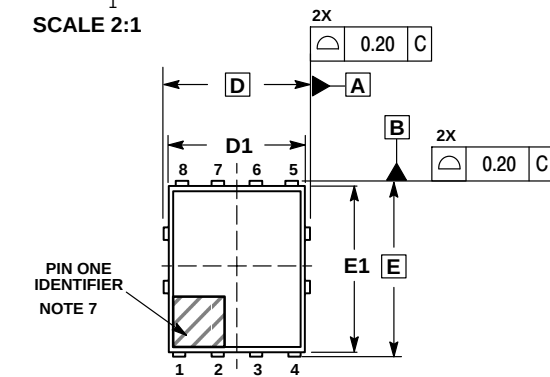
SCALE 2:1

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

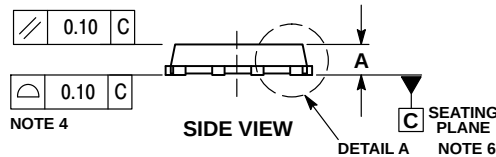
DATE 23 NOV 2021

NOTES:

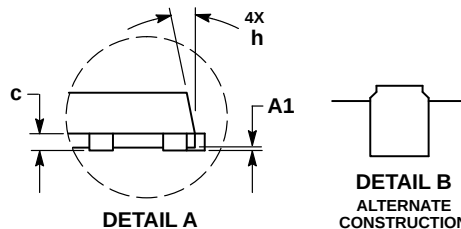
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30 MM FROM THE TERMINAL TIP.
4. PROFILE TOLERANCE APPLIES TO THE EXPOSED PAD AS WELL AS THE TERMINALS.
5. DIMENSIONS D1 AND E1 DO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



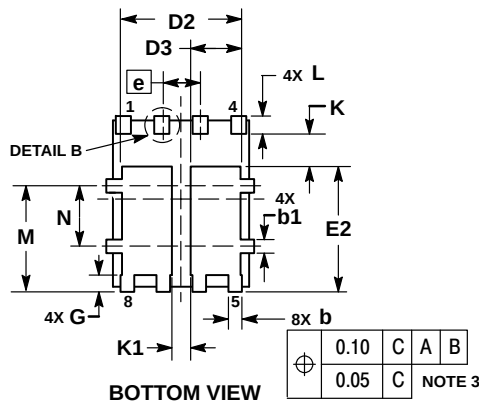
TOP VIEW



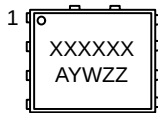
SIDE VIEW



DETAIL A

DETAIL B
ALTERNATE
CONSTRUCTION


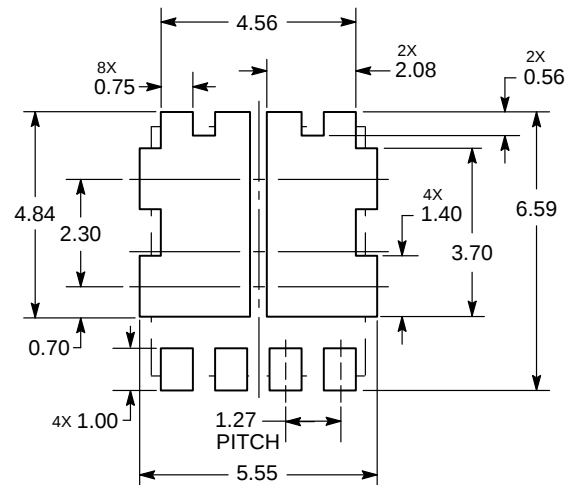
BOTTOM VIEW

**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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