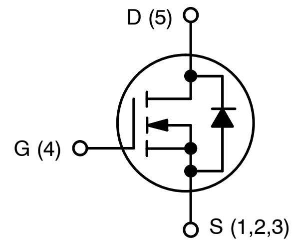
MOSFET - Power, Single N-Channel, STD Gate, DUAL COOL® DFN8 5x6

80 V, 2.6 mΩ, 154 A

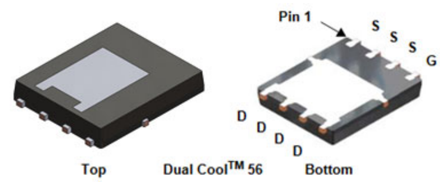
Product Preview

NTMFSC2D6N08X

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
80 V	2.6 mΩ @ 10 V	154 A



N–CHANNEL MOSFET



DFN8
CASE TBD

Features

- Advanced Dual–Sided Cooled Packaging
- Low Q_{RR}, Soft Recovery Body Diode
- 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

- Synchronous Rectification (SR) in DC–DC and AC–DC
- Primary Switch in Isolated DC–DC Converter
- Motor Drives

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

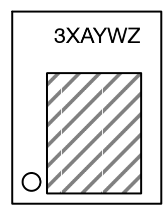
Parameter		Symbol	Value	Unit
Drain–to–Source Voltage		V_{DSS}	80	V
Gate–to–Source Voltage		V_{GS}	±20	V
Continuous Drain Current (Note 1)	T_C = 25°C	I_D	154	A
	T_C = 100°C		109	
Power Dissipation (Note 1)	T_C = 25°C	P_D	133	W
Pulsed Drain Current	T_C = 25°C, t_p = 100 μs	I_{DM}	634	A
Pulsed Source Current (Body Diode)		I_{SM}	634	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	−55 to +175	°C
Source Current (Body Diode)		I_S	201	A
Single Pulse Avalanche Energy (I_{PK} = 53 A) (Note 3)		E_{AS}	140	mJ
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.

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. Actual continuous current will be limited by thermal & electromechanical application board design.
3. E_{AS} of 140 mJ is based on started T_J = 25°C, I_{AS} = 53 A, V_{DD} = 64 V, V_{GS} = 10 V, 100% avalanche tested

This document contains information on a product under development. **onsemi** reserves the right to change or discontinue this product without notice.

MARKING DIAGRAM



3X	=	Specific Device Code
A	=	Assembly Location
Y	=	Year
W	=	Work Week
Z	=	Assembly Lot Code

ORDERING INFORMATION

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

THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction−to−Case, Bottom	$R_{\theta JC}$	1.12	°C/W
Thermal Resistance, Junction−to−Case, Top	$R_{\theta JC}$	1.7	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	39	°C/W

4. Surface−mounted on FR4 board using 1 in^2 pad, 1 oz. Cu.
5. $R_{\theta JA}$ is determined by the user's board design.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA	80			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$\Delta V_{(BR)DSS}/\Delta T_J$	I_D = 1 mA. Referenced to 25°C		31.6		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 80 V, T_J = 25°C			10	μA
		V_{DS} = 80 V, T_J = 125°C			250	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 20 V, V_{DS} = 0 V			100	nA
ON CHARACTERISTICS						
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 37 A		2.2	2.6	mΩ
		V_{GS} = 6 V, I_D = 18 A		3.3	5.2	
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 184 μA	2.4		3.6	V
Gate Threshold Voltage Temperature Coefficient	$\Delta V_{GS(TH)}/\Delta T_J$	V_{GS} = V_{DS}, I_D = 184 μA		−7.5		mV/°C
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 37 A		115		S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, V_{DS} = 40 V, f = 1 MHz		3200		pF
Output Capacitance	C_{OSS}			930		
Reverse Transfer Capacitance	C_{RSS}			14		
Output Charge	Q_{OSS}			66		nC
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 6 V, V_{DD} = 40 V, I_D = 37 A		28		
		V_{GS} = 10 V, V_{DD} = 40 V, I_D = 37 A		45		
Threshold Gate Charge	$Q_{G(TH)}$			10		
Gate−to−Source Charge	Q_{GS}			15		
Gate−to−Drain Charge	Q_{GD}			7		
Gate Plateau Voltage	V_{GP}			4.7		V
Gate Resistance	R_G	f = 1 MHz		0.8		Ω
SWITCHING CHARACTERISTICS						
Turn−On Delay Time	$t_{d(ON)}$	Resistive Load, V_{GS} = 0/10 V, V_{DD} = 40 V, I_D = 37 A, R_G = 2.5 Ω		24		ns
Rise Time	t_r			8		
Turn−Off Delay Time	$t_{d(OFF)}$			35		
Fall Time	t_f			6		

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
SOURCE–TO–DRAIN DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 37 A, T_J = 25°C		0.82	1.2	V
		V_{GS} = 0 V, I_S = 37 A, T_J = 125°C		0.66		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI/dt = 1000 A/μs, I_S = 37 A, V_{DD} = 40 V		23		ns
Charge Time	t_a			13		
Discharge Time	t_b			11		
Reverse Recovery Charge	Q_{RR}			163		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

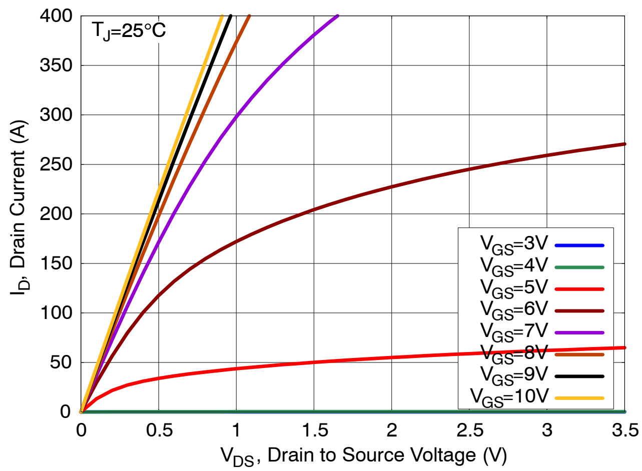


Figure 1. On−Region Characteristics

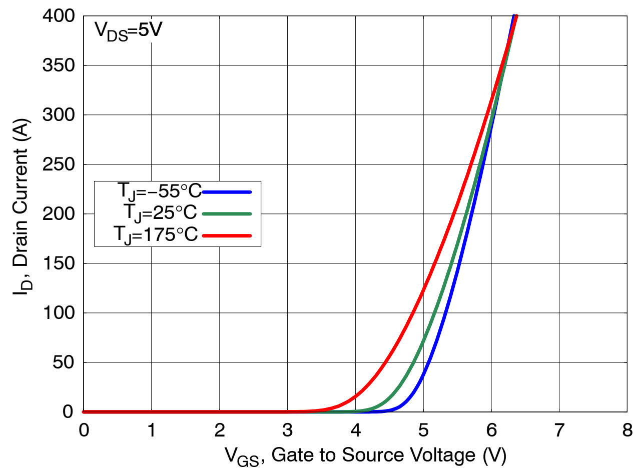


Figure 2. Transfer Characteristics

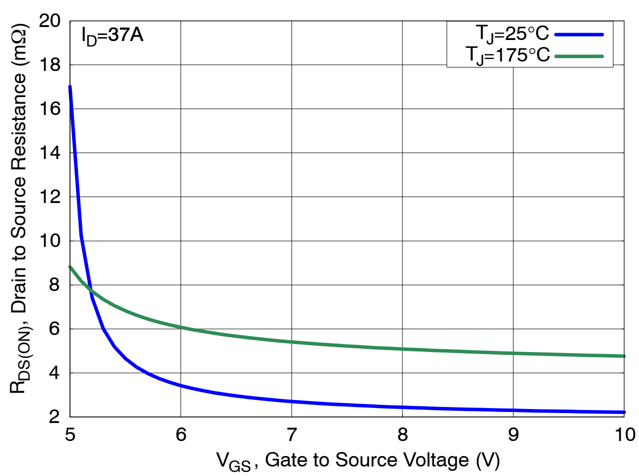


Figure 3. On−Resistance vs. Gate Voltage

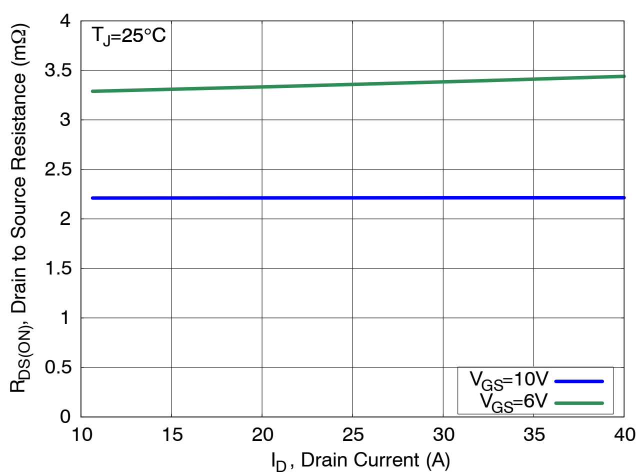


Figure 4. On−Resistance vs. Drain Current

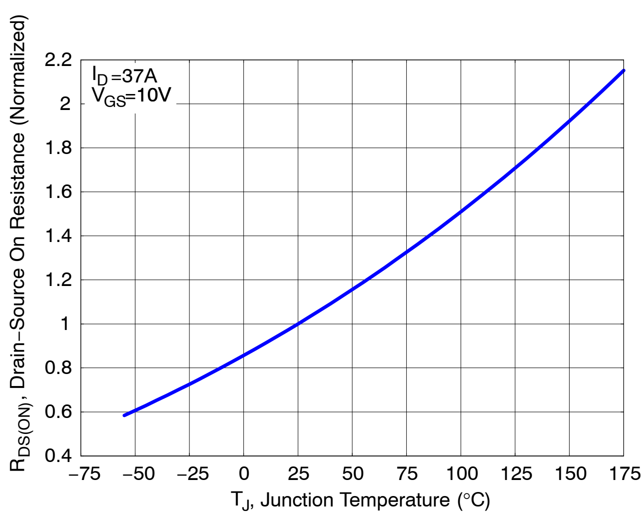


Figure 5. Normalized ON Resistance vs. Junction Temperature

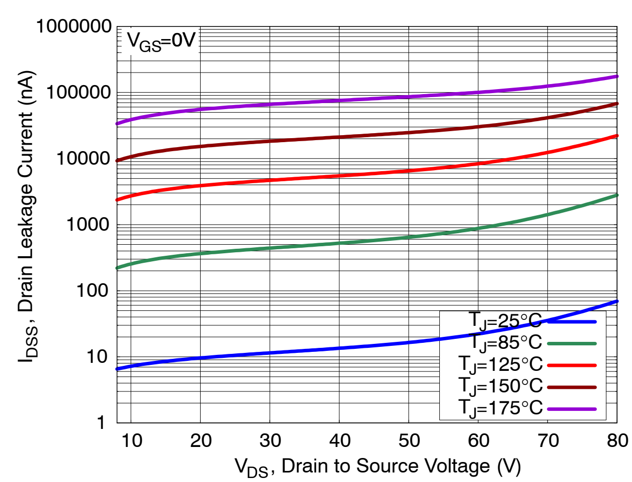


Figure 6. Drain Leakage Current vs. Drain Voltage

TYPICAL CHARACTERISTICS

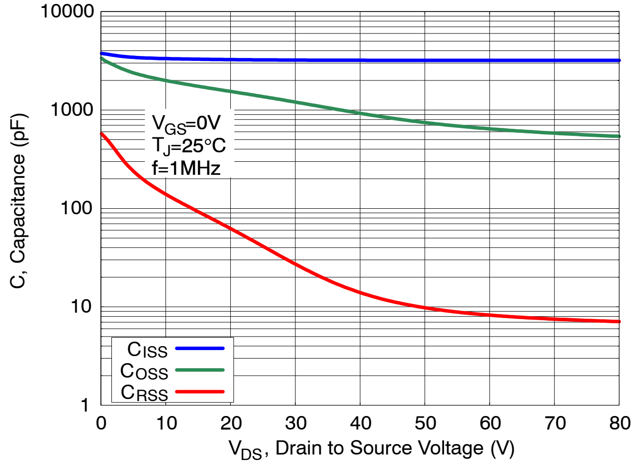


Figure 7. Capacitance Characteristics

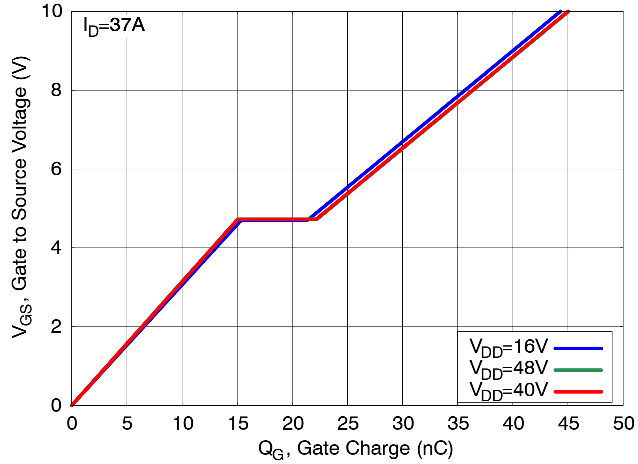


Figure 8. Gate Charge Characteristics

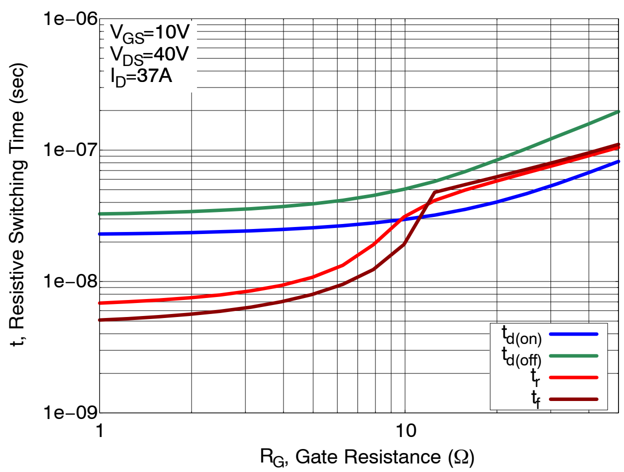


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

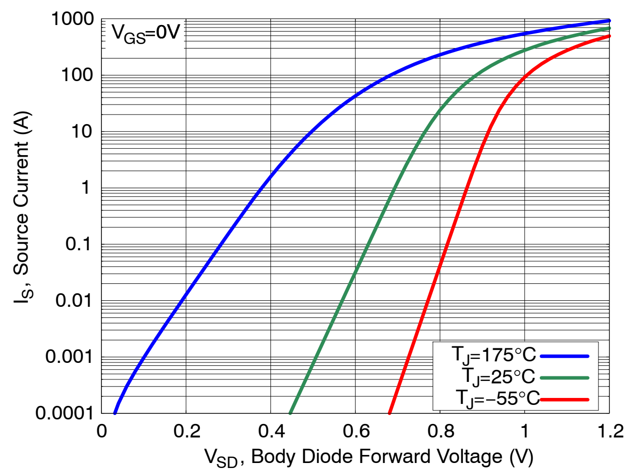


Figure 10. Diode Forward Characteristics

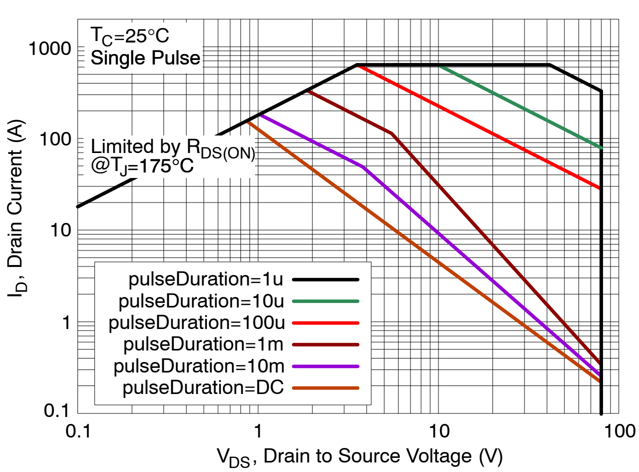


Figure 11. Safe Operating Area (SOA)

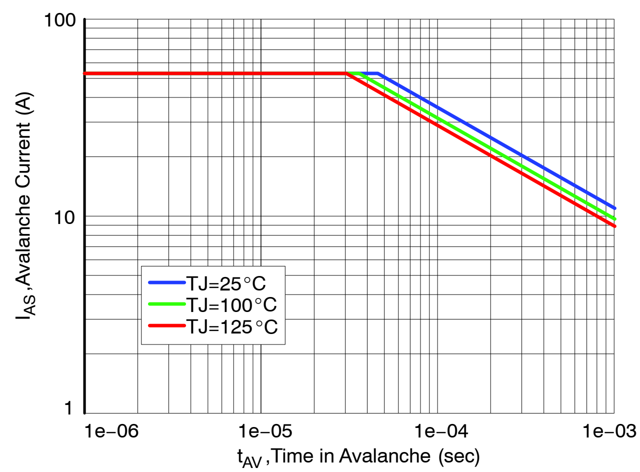


Figure 12. Avalanche Current vs. Pulse Time (UIS)

TYPICAL CHARACTERISTICS

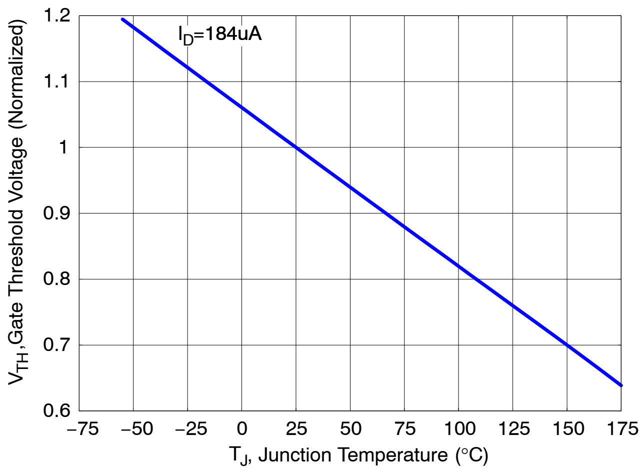


Figure 13. Gate Threshold Voltage vs. Junction Temperature

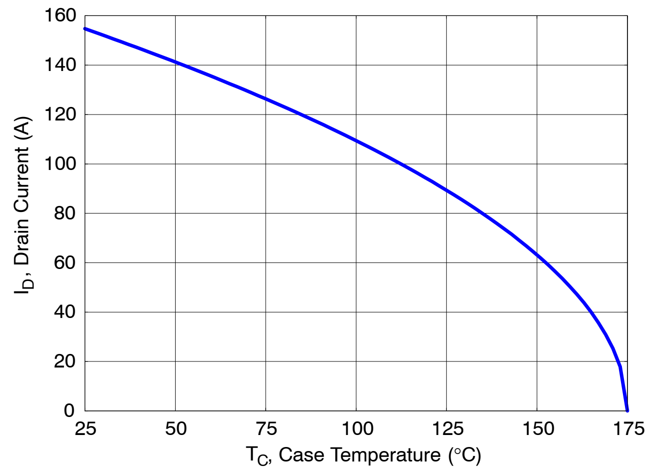


Figure 14. Maximum Current vs. Case Temperature

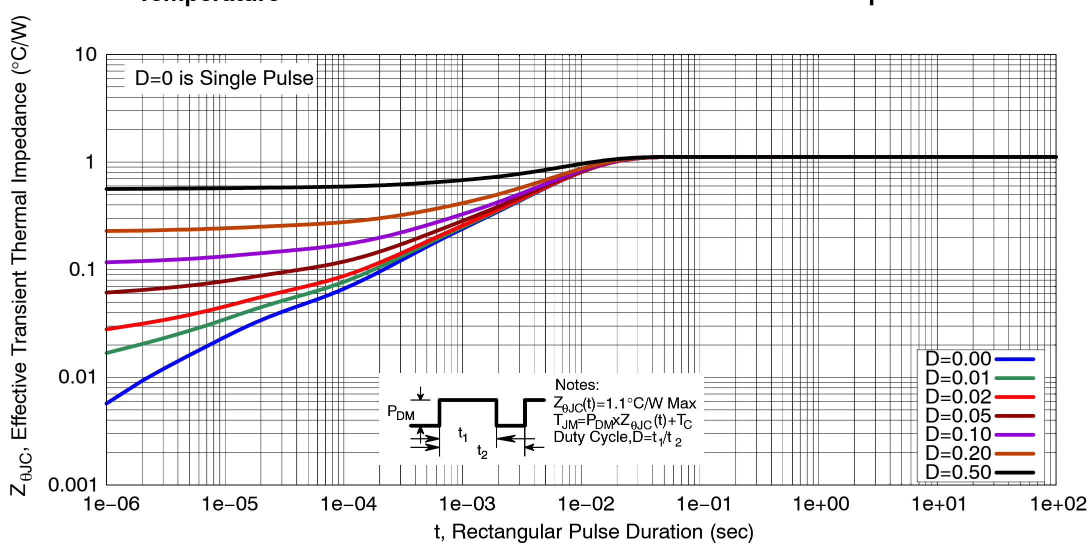
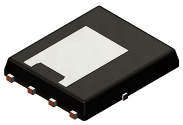


Figure 15. Transient Thermal Response

ORDERING INFORMATION

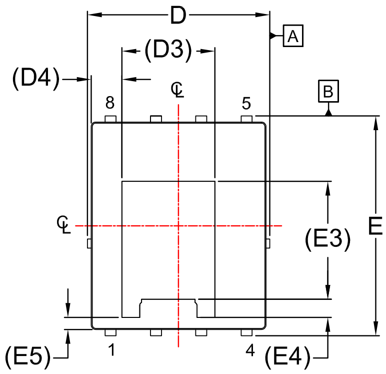
Device Order Number	Device Marking	Package Type	Shipping†
NTMFSC2D6N08XTWG	3X	DFN8 5x6 (Pb−Free/Halogen Free)	3000 / Tape & Reel

†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.

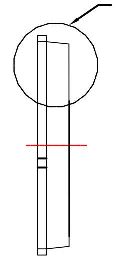


DFN8 5x6.15, 1.27P, DUAL COOL
CASE 506EG
ISSUE D

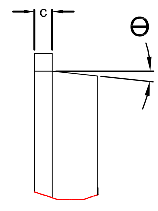
DATE 25 AUG 2020



TOP VIEW



SIDE VIEW

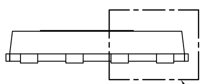


DETAIL "A"
SCALE: 2:1

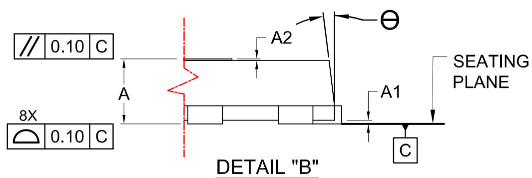
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
4. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.
5. 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.

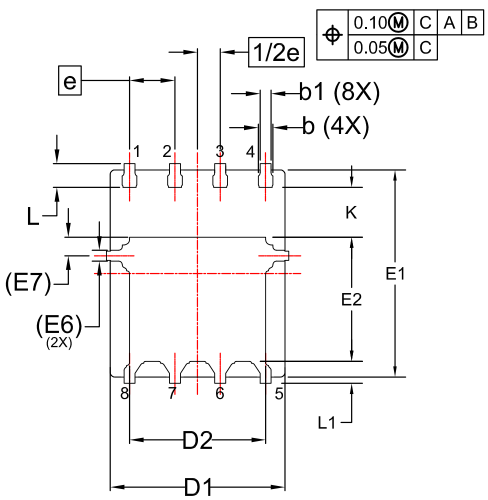
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.85	0.90	0.95
A1	-	-	0.05
A2	-	-	0.05
b	0.31	0.41	0.51
b1	0.21	0.31	0.41
c	0.20	0.25	0.30
D	4.90	5.00	5.10
D1	4.80	4.90	5.00
D2	3.67	3.82	3.97
D3	2.60 REF		
D4	0.86 REF		
E	6.05	6.15	6.25
E1	5.70	5.80	5.90
E2	3.38	3.48	3.58
E3	3.30 REF		
E4	0.50 REF		
E5	0.34 REF		
E6	0.30 REF		
E7	0.52 REF		
e	1.27 BSC		
1/2e	0.635 BSC		
K	1.30	1.40	1.50
L	0.56	0.66	0.76
L1	0.52	0.62	0.72
θ	0°	---	12°



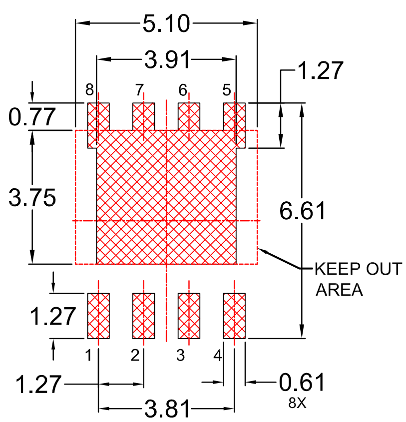
FRONT VIEW



DETAIL "B"
SCALE: 2:1



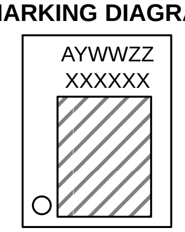
BOTTOM VIEW



LAND PATTERN RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*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.

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DESCRIPTION:	**DFN8 5x6.15, 1.27P, DUAL COOL**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

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