MOSFET – N-Channel, Shielded Gate, POWERTRENCH®

80 V, 60 A, 7.8 mΩ

FDMC008N08C

General Description

This N−Channel MV MOSFET is produced using **onsemi**'s advanced POWERTRENCH process that incorporates Shielded Gate technology. This process has been optimized to minimise on−state resistance and yet maintain superior switching performance with best in class soft body diode.

Features

- Shielded Gate MOSFET Technology
- Max $R_{DS(on)}$ = 7.8 mΩ at V_{GS} = 10 V, I_D = 21 A
- Max $R_{DS(on)}$ = 19.3 mΩ at V_{GS} = 6 V, I_D = 10 A
- 50% Lower Qrr Than Other MOSFET Suppliers
- Lowers Switching Noise/EMI
- MSL1 Robust Package Design
- 100% UIL tested
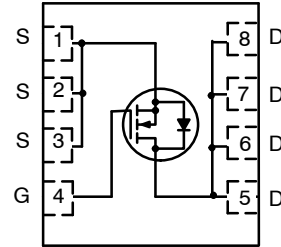- Pb−Free, Halide Free and RoHS Compliant

Applications

- Primary DC−DC MOSFET
- Synchronous Rectifier in DC−DC and AC−DC
- Motor Drive
- Solar

V_{DS}	$R_{DS(ON)}$ MAX	I_D MAX
80 V	7.8 mΩ @ 10 V	60 A
	19.3 mΩ @ 6 V	

N-CHANNEL MOSFET
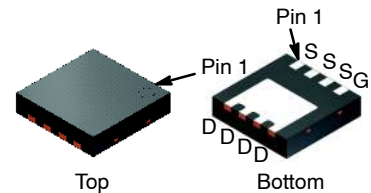
**WDFN8 3.3 × 3.3, 0.65P
(Power 33)
CASE 483AW**

MARKING DIAGRAM

ZXYYKK
FDMC
008N08C
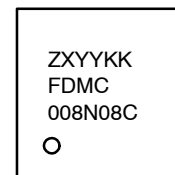
Z	= Assembly Plant Code
XYY	= 3−Digit Date Code Format
KK	= 2−Alphanumeric Lot Run
	Traceability Code
FDMC008N08C	= Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping†
FDMC008N08C	WDFN8 (Pb−Free, Halide 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.

MOSFET MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DS}	Drain to Source Voltage	80	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current: Continuous, T_C = 25°C (Note 5) Continuous, T_C = 100°C (Note 5) Continuous, T_A = 25°C (Note 1a) Pulsed (Note 4)	 60 38 12 273	A
E_{AS}	Single Pulse Avalanche Energy (Note 3)	150	mJ
P_D	Power Dissipation: T_C = 25°C T_A = 25°C (Note 1a)	 57 2.3	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	−55 to +150	°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 CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.2	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient (Note 1a)	53	

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
BV_{DSS}	Drain to Source Breakdown Voltage	I_D = 250 μA, V_{GS} = 0 V	80	–	–	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, referenced to 25°C	–	51	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 64 V, V_{GS} = 0 V	–	–	1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	–	–	100	nA
ON CHARACTERISTICS						
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 120 μA	2.0	3.0	4.0	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate to Source Threshold Voltage Temperature Coefficient	I_D = 120 μA, referenced to 25°C	–	–8.4	–	mV/°C
$R_{DS(on)}$	Static Drain to Source On Resistance	V_{GS} = 10 V, I_D = 21 A	–	6.3	7.8	mΩ
		V_{GS} = 6 V, I_D = 10 A	–	9.6	19.3	
		V_{GS} = 10 V, I_D = 21 A, T_J = 125°C	–	10.7	13.5	
g_{FS}	Forward Transconductance	V_{DS} = 5 V, I_D = 21 A	–	50	–	S
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	V_{DS} = 40 V, V_{GS} = 0 V, f = 1 MHz	–	1535	2150	pF
C_{oss}	Output Capacitance		–	517	730	pF
C_{rss}	Reverse Transfer Capacitance		–	19	30	pF
R_g	Gate Resistance		0.1	0.4	0.8	Ω
SWITCHING CHARACTERISTICS						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 40 V, I_D = 21 A, V_{GS} = 10 V, R_{GEN} = 6 Ω	–	12	22	ns
t_r	Rise Time		–	3	10	ns
$t_{d(off)}$	Turn-Off Delay Time		–	18	32	ns
t_f	Fall Time		–	3	10	ns
$Q_{g)}$	Total Gate Charge	V_{GS} = 0 V to 10 V, V_{DD} = 40 V, I_D = 21 A	–	21	29	nC
		V_{GS} = 0 V to 6 V, V_{DD} = 40 V, I_D = 21 A	–	13	18	nC
Q_{gs}	Gate to Source Charge	V_{DD} = 40 V, I_D = 21 A	–	6.7	–	nC
Q_{gd}	Gate to Drain "Miller" Charge	V_{DD} = 40 V, I_D = 21 A	–	3.8	–	nC
Q_{oss}	Output Charge	V_{DD} = 40 V, V_{GS} = 0 V	–	28	–	nC
Q_{sync}	Total Gate Charge Sync.	V_{DS} = 0 V, I_D = 21 A	–	18	–	nC

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS						
V_{SD}	Source to Drain Diode Forward Voltage	V_{GS} = 0 V, I_S = 2 A (Note 2)	–	0.7	1.2	V
		V_{GS} = 0 V, I_S = 21 A (Note 2)	–	0.8	1.3	
t_{rr}	Reverse Recovery Time	I_F = 10 A, di/dt = 300 A/μs	–	19	30	ns
Q_{rr}	Reverse Recovery Charge		–	27	44	nC
t_{rr}	Reverse Recovery Time	I_F = 10 A, di/dt = 1000 A/μs	–	15	23	ns
Q_{rr}	Reverse Recovery Charge		–	65	105	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.

NOTES:

1. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 x 1.5 in. board of FR−4 material. $R_{\theta CA}$ is determined by the user's board design.
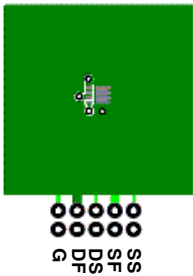
a) 53°C/W when mounted on a 1 in^2 pad of 2 oz copper.
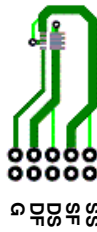
b) 125°C/W when mounted on a minimum pad of 2 oz copper.

2. Pulse Test: Pulse Width < 300 μs, Duty cycle < 2.0%.
3. E_{AS} of 150 mJ is based on starting T_J = 25°C; L = 3 mH, I_{AS} = 10 A, V_{DD} = 10 V, V_{GS} = 80 V, 100% test at L = 0.1 mH, I_{AS} = 33 A.
4. Pulsed Id please refer to Fig 11 SOA graph for more details.
5. Computed continuous current limited to Max Junction Temperature only, actual continuous current will be limited by thermal & electro−mechanical application board design.

TYPICAL CHARACTERISTICS

(T_J = 25°C unless otherwise noted)
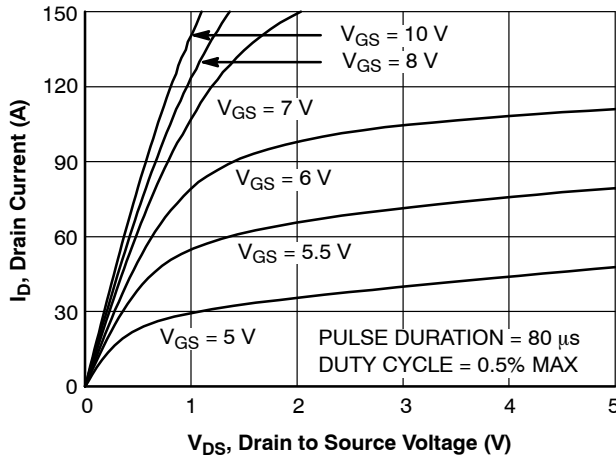
Figure 1. On−Region Characteristics
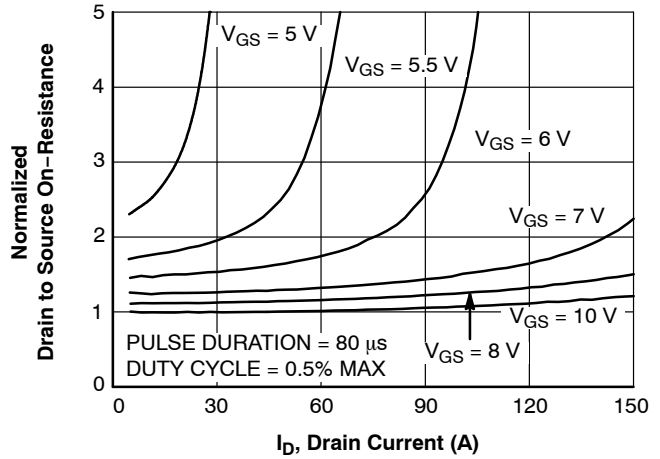
Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage
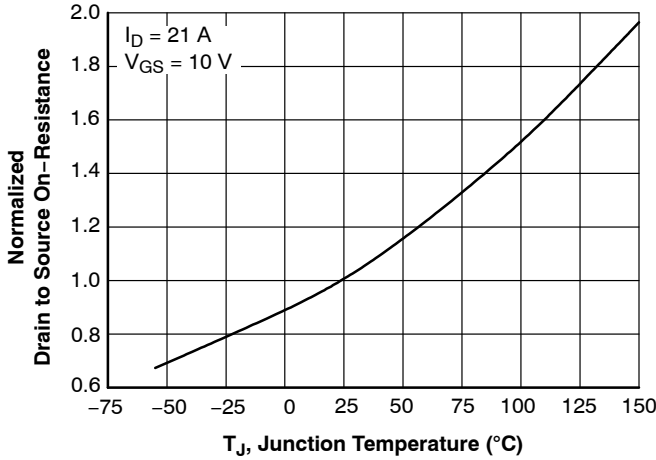
Figure 3. Normalized On−Resistance vs. Junction Temperature
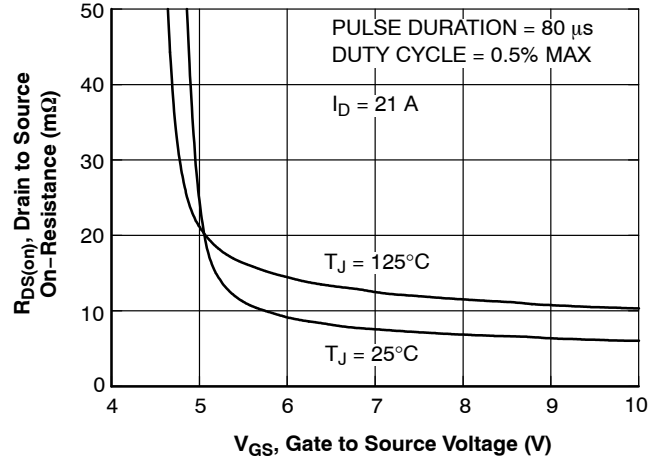
Figure 4. On−Resistance vs. Gate to Source Voltage
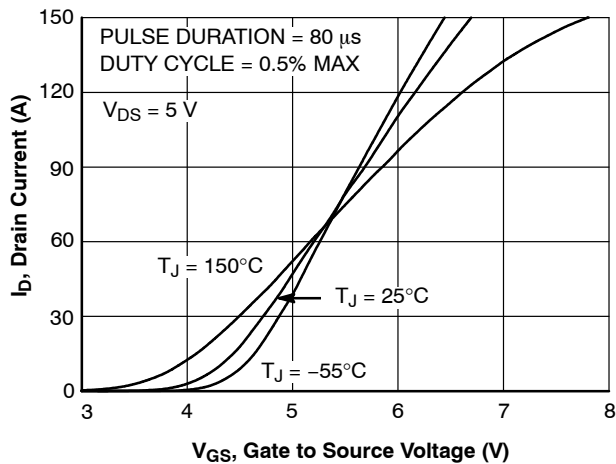
Figure 5. Transfer Characteristics
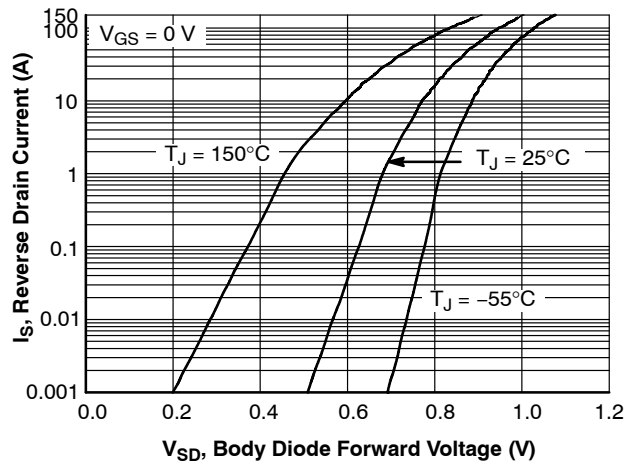
Figure 6. Source to Drain Diode Forward Voltage vs. Source Current
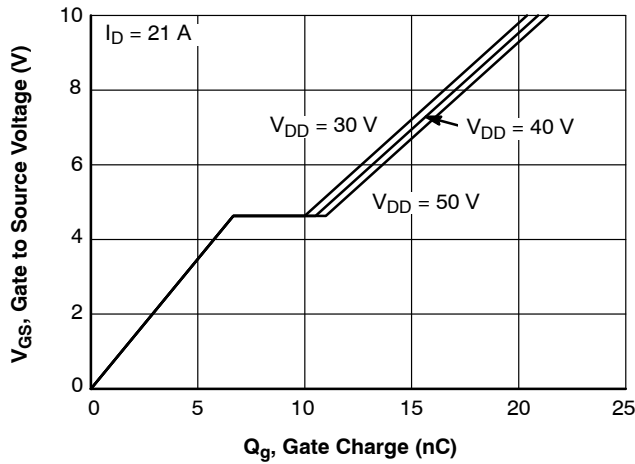
TYPICAL CHARACTERISTICS (continued)

(T_J = 25°C unless otherwise noted)

Figure 7. Gate Charge Characteristics
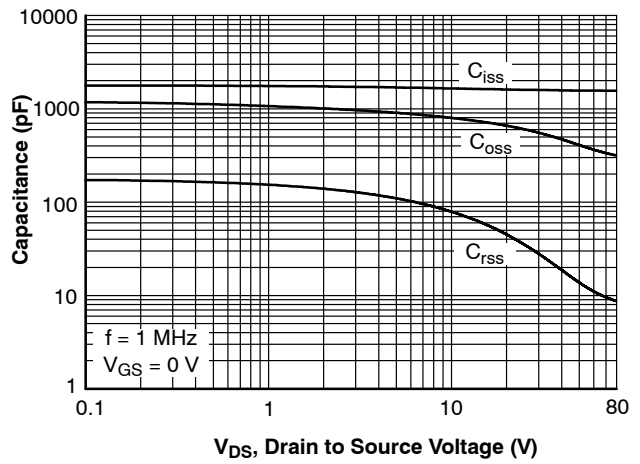
Figure 8. Capacitance vs. Drain to Source Voltage
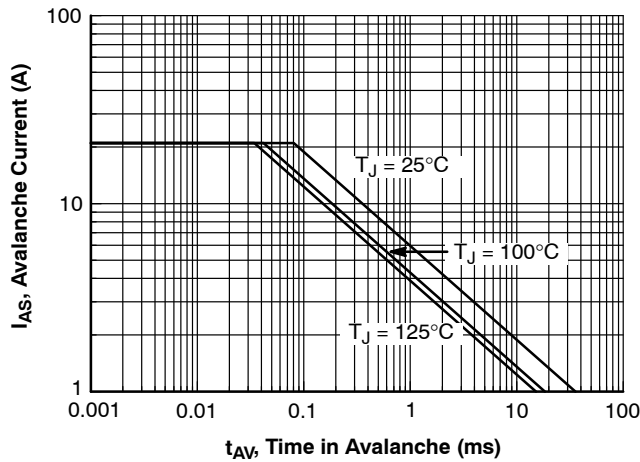
Figure 9. Unclamped Inductive Switching Capability
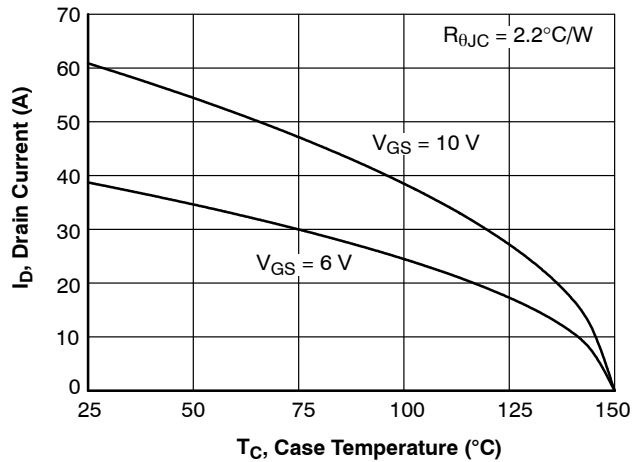
Figure 10. Maximum Continuous Drain Current vs. Case Temperature
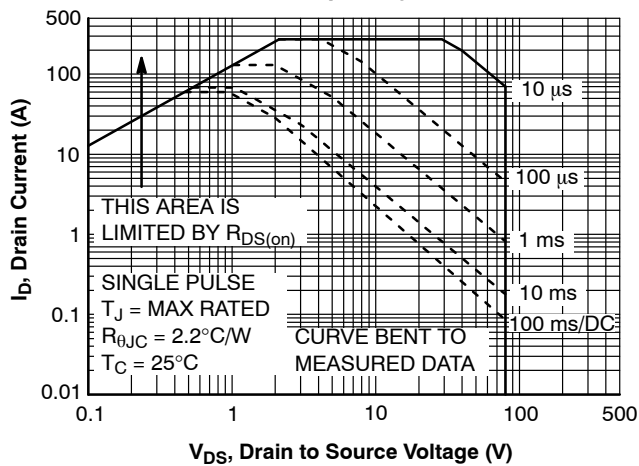
Figure 11. Forward Bias Safe Operating Area
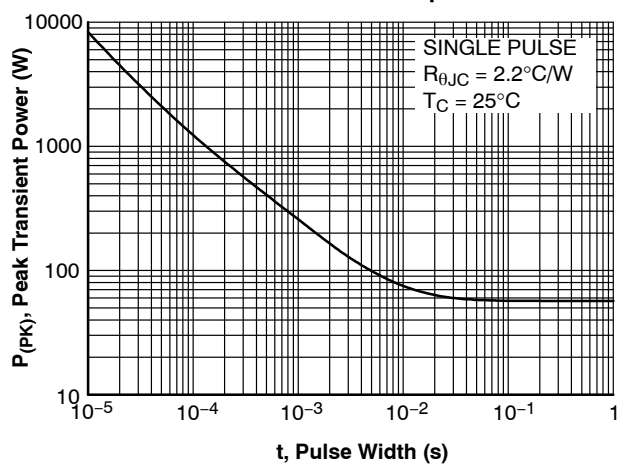
Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL CHARACTERISTICS (CONTINUED)

(T_J = 25°C unless otherwise noted)
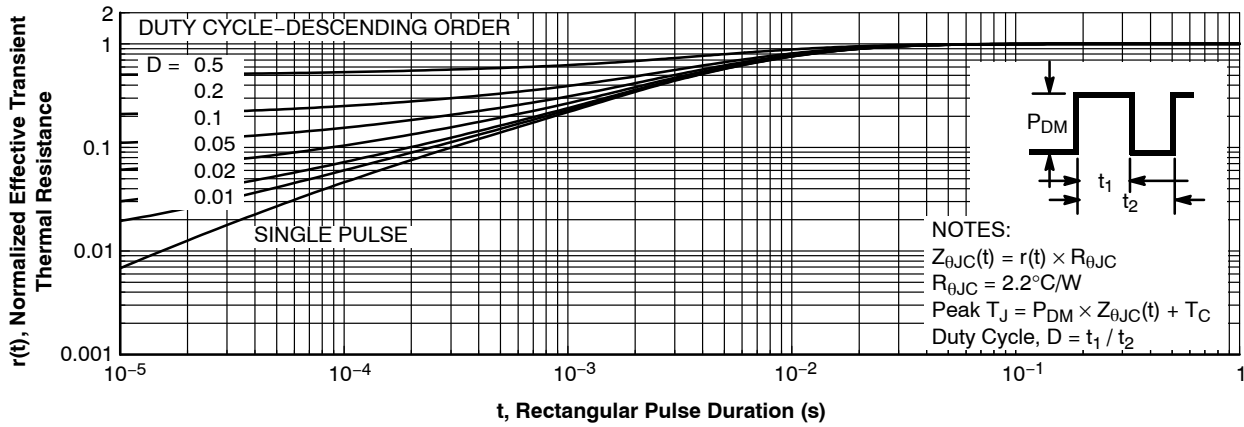
Figure 13. Junction−to−Case Transient Thermal Response Curve

DUTY CYCLE−DESCENDING ORDER

D = 0.5, 0.2, 0.1, 0.05, 0.02, 0.01

SINGLE PULSE

NOTES:
$Z_{\theta JC}(t) = r(t) \times R_{\theta JC}$
$R_{\theta JC} = 2.2°C/W$
Peak $T_J = P_{DM} \times Z_{\theta JC}(t) + T_C$
Duty Cycle, $D = t_1 / t_2$

r(t), Normalized Effective Transient Thermal Resistance

t, Rectangular Pulse Duration (s)

WDFN8 3.3X3.3, 0.65P
CASE 483AW
ISSUE A

DATE 10 SEP 2019

NOTES:

1. CONTROLLING DIMENSION: MILLIMETERS.
2. COPLANARITY APPLIES TO THE EXPOSED PADS AS WELL AS THE TERMINALS.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.
4. 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.

TOP VIEW

FRONT VIEW

SEE DETAIL 'A'

DETAIL A
SCALE: 2x

SEATING PLANE
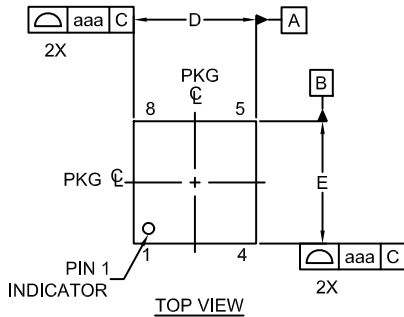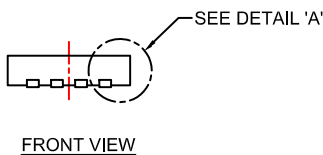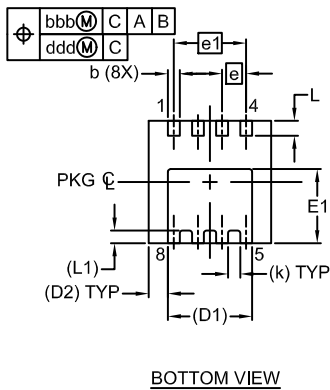
BOTTOM VIEW
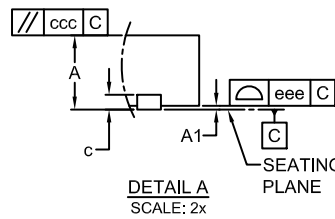
LAND PATTERN RECOMMENDATION*

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	-	-	0.05
b	0.27	0.32	0.37
c	0.15	0.20	0.25
D	3.20	3.30	3.40
D1	2.27 REF		
D2	0.52 REF		
E	3.20	3.30	3.40
E1	1.85	1.95	2.05
e	0.65 BSC		
e1	1.95 BSC		
k	0.33 REF		
L	0.30	0.40	0.50
L1	0.34 REF		
aaa	0.10		
bbb	0.10		
ccc	0.10		
ddd	0.05		
eee	0.05		

*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
AYWW

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

*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.

DOCUMENT NUMBER:	98AON13672G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	WDFN8 3.3X3.3, 0.65P		PAGE 1 OF 1

ADDITIONAL INFORMATION

◊