NVTFS4C13N

MOSFET – Power, Single N-Channel, μ8FL

30 V, 9.4 mΩ, 40 A

Features

- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- NVTFS4C13NWF – Wettable Flanks Product
- NVT Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

ON Semiconductor®

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
30 V	9.4 mΩ @ 10 V	40 A
	14 mΩ @ 4.5 V	

D (5,6)

G (4)

S (1,2,3)

N−CHANNEL MOSFET

MARKING DIAGRAM

WDFN8 (μ8FL) CASE 511AB

```
S      XXXX   D
S      AYWW▪  D
S             D
G             D
```

4C13 = Specific Device Code for NVMTS4C13N
13WF = Specific Device Code of NVTFS4C13NWF
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 4)	Steady State	T_A = 25°C	I_D	14	A
		T_A = 100°C		10	
Power Dissipation $R_{\theta JA}$ (Note 1, 2, 4)		T_A = 25°C	P_D	3.0	W
		T_A = 100°C		1.5	
Continuous Drain Current $R_{\theta JC}$ (Note 1, 3, 4)		T_C = 25°C	I_D	40	
		T_C = 100°C		28	A
Power Dissipation $R_{\theta JC}$ (Note 1, 3, 4)		T_C = 25°C	P_D	26	W
		T_C = 100°C		13	
Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		I_{DM}	152	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	24	A
Single Pulse Drain−to−Source Avalanche Energy (T_J = 25°C, I_L = 14 A_{pk}, L = 0.1 mH)			E_{AS}	10	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.

THERMAL RESISTANCE MAXIMUM RATINGS

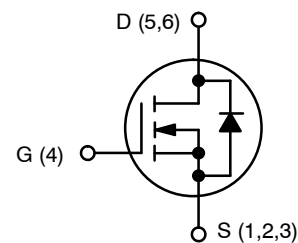| Parameter	Symbol	Value	Unit
Junction−to−Case – Steady State (Drain) (Notes 1 and 4)	$R_{\theta JC}$	5.8	°C/W
Junction−to−Ambient – Steady State (Notes 1 and 2)	$R_{\theta JA}$	50	

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. Assumes heat−sink sufficiently large to maintain constant case temperature independent of device power.
4. Continuous DC current rating. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.
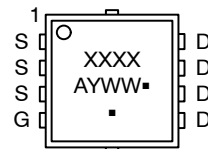
ORDERING INFORMATION

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				14.9		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V	T_J = 25°C			1.0	μA
			T_J = 125°C			10	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS (Note 5)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.3		2.1	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				4.8		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 30 A		7.5	9.4	mΩ
		V_{GS} = 4.5 V	I_D = 12 A		11.2	14	
Forward Transconductance	g_{FS}	V_{DS} = 1.5 V, I_D = 15 A			40		S
Gate Resistance	R_G	T_A = 25°C			1.0		Ω
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 15 V			770		pF
Output Capacitance	C_{OSS}				443		
Reverse Transfer Capacitance	C_{RSS}				127		
Capacitance Ratio	C_{RSS}/C_{ISS}	V_{GS} = 0 V, V_{DS} = 15 V, f = 1 MHz			0.165		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V; I_D = 30 A			7.8		nC
Threshold Gate Charge	$Q_{G(TH)}$				1.4		
Gate−to−Source Charge	Q_{GS}				2.9		
Gate−to−Drain Charge	Q_{GD}				3.7		
Gate Plateau Voltage	V_{GP}				3.6		V
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 15 V; I_D = 30 A			15.2		nC
SWITCHING CHARACTERISTICS (Note 6)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DS} = 15 V, I_D = 15 A, R_G = 3.0 Ω			9		ns
Rise Time	t_r				35		
Turn−Off Delay Time	$t_{d(OFF)}$				13		
Fall Time	t_f				5		
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DS} = 15 V, I_D = 15 A, R_G = 3.0 Ω			6.0		ns
Rise Time	t_r				26		
Turn−Off Delay Time	$t_{d(OFF)}$				16		
Fall Time	t_f				3.0		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 30 A	T_J = 25°C		0.82	1.1	V
			T_J = 125°C		0.69		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dIS/dt = 100 A/μs, I_S = 30 A			23.4		ns
Charge Time	t_a				12.1		
Discharge Time	t_b				11.3		
Reverse Recovery Charge	Q_{RR}				9.7		nC

5. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
6. Switching characteristics are independent of operating junction temperatures.
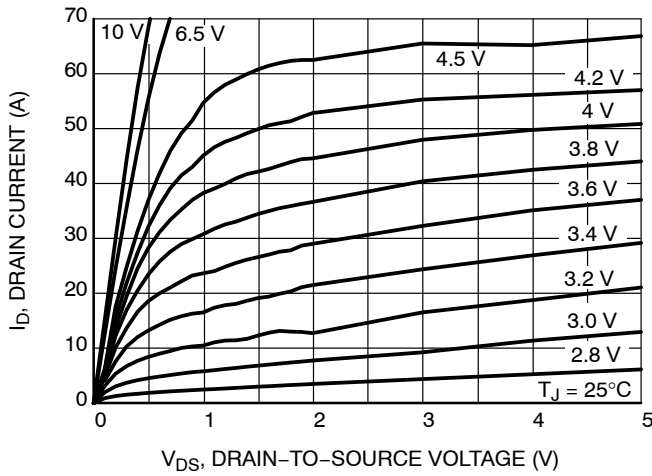
TYPICAL CHARACTERISTICS
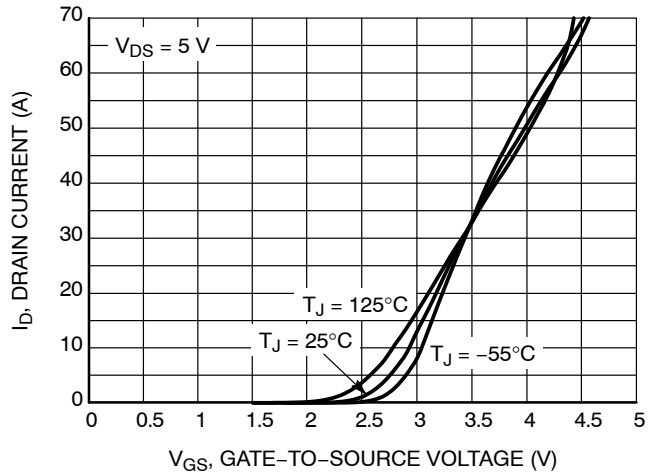

Figure 1. On−Region Characteristics

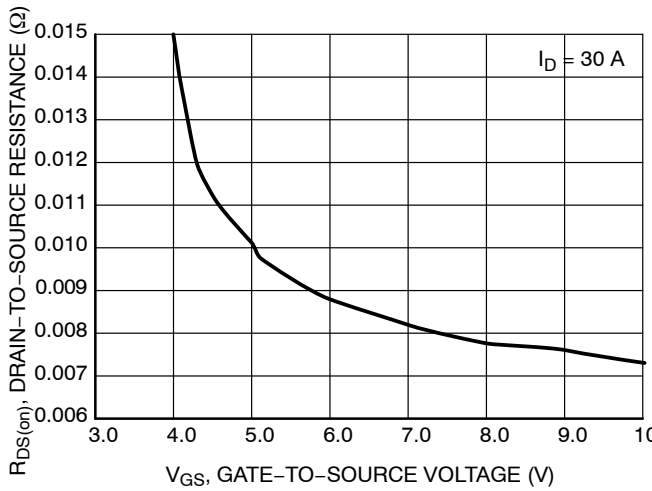Figure 2. Transfer Characteristics

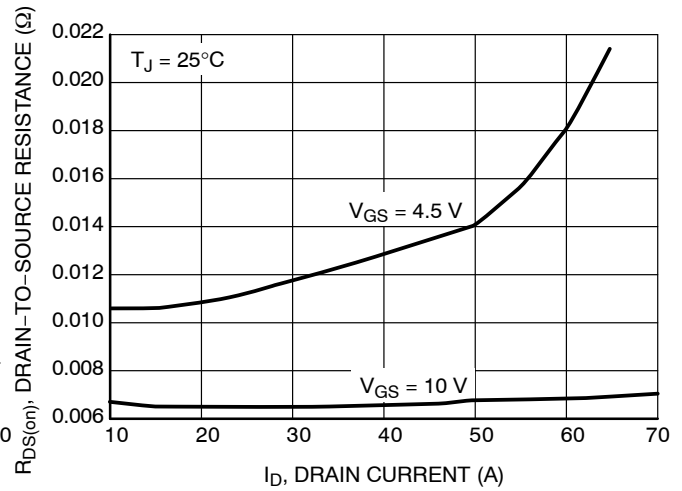Figure 3. On−Resistance vs. V_{GS}

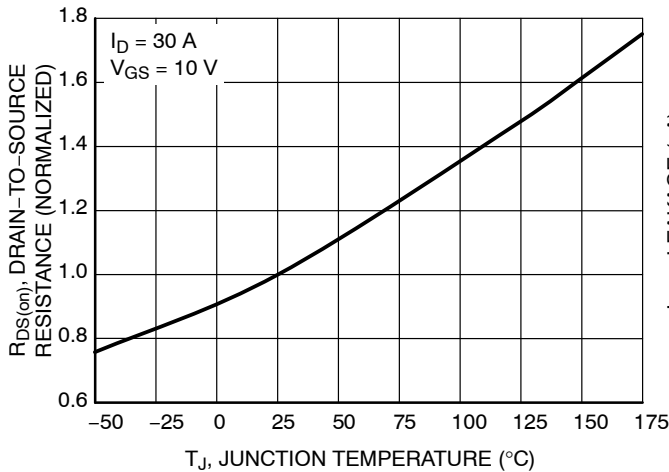Figure 4. On−Resistance vs. Drain Current and Gate Voltage
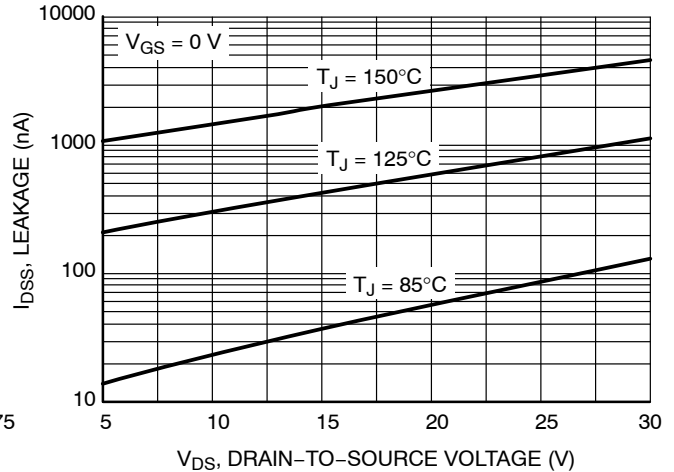

Figure 5. On−Resistance Variation with Temperature

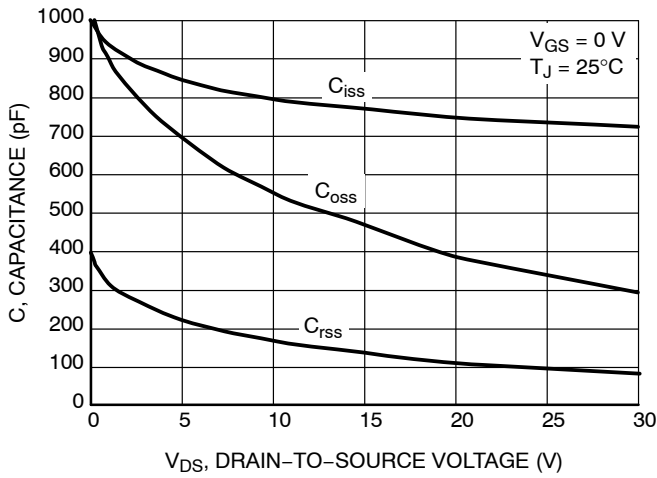Figure 6. Drain−to−Source Leakage Current vs. Voltage

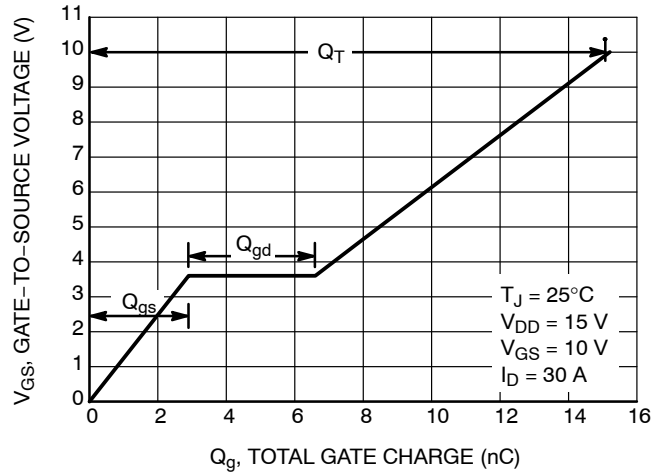## TYPICAL CHARACTERISTICS

Figure 7. Capacitance Variation

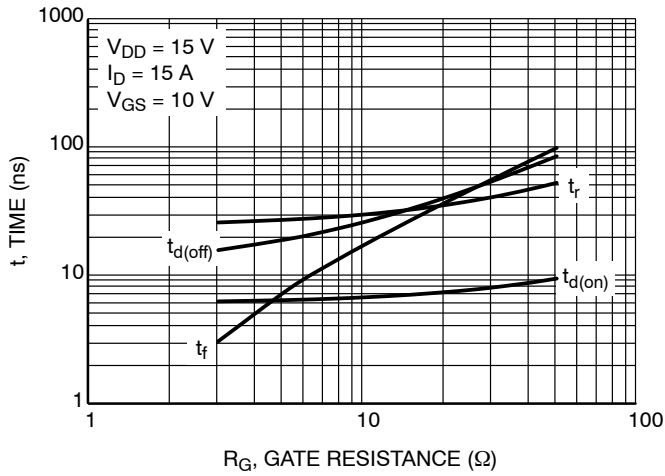Figure 8. Gate–to–Source and
Drain–to–Source Voltage vs. Total Charge

Figure 9. Resistive Switching Time Variation
vs. Gate Resistance
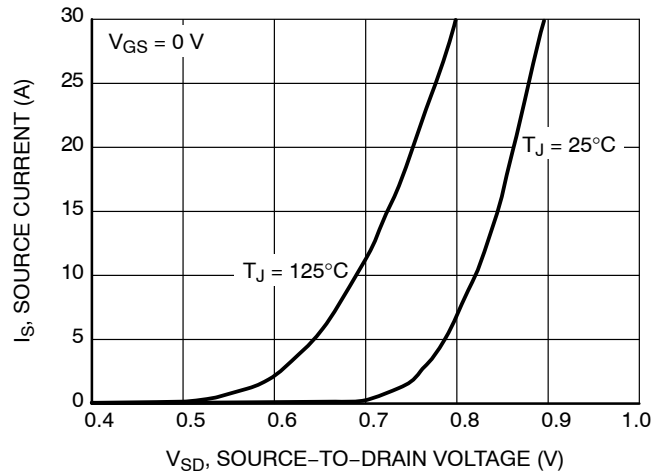
Figure 10. Diode Forward Voltage vs. Current
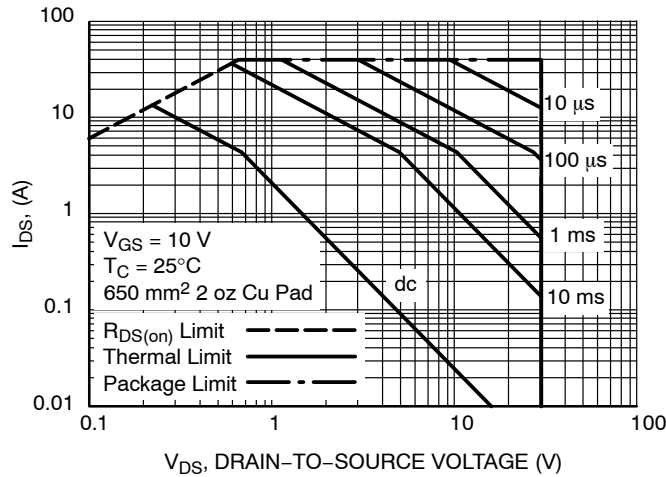
Figure 11. Maximum Rated Forward Biased
Safe Operating Area

TYPICAL CHARACTERISTICS
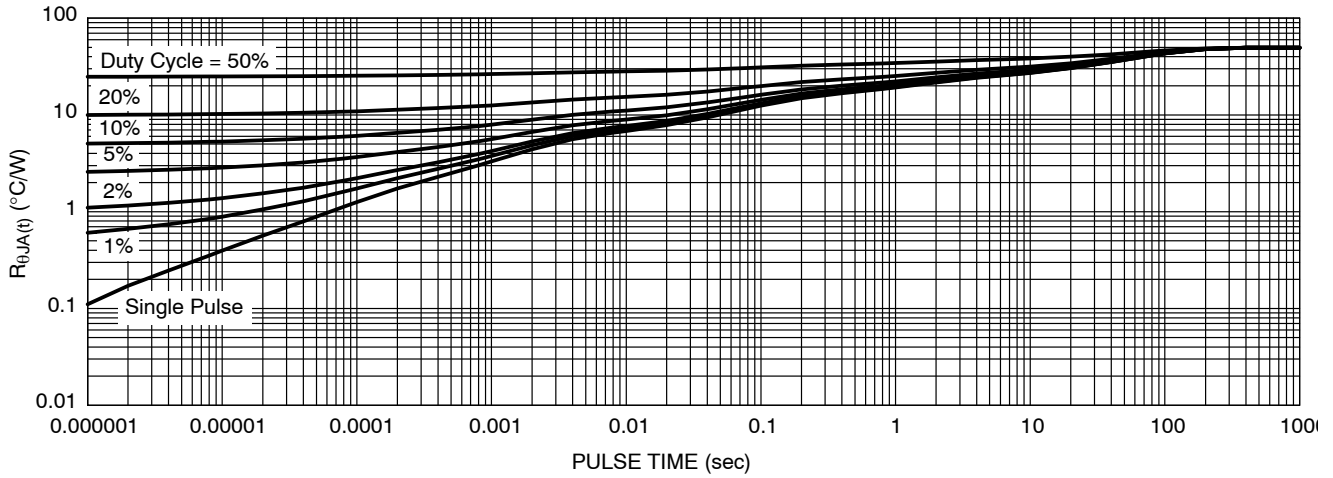
Figure 12. Thermal Response
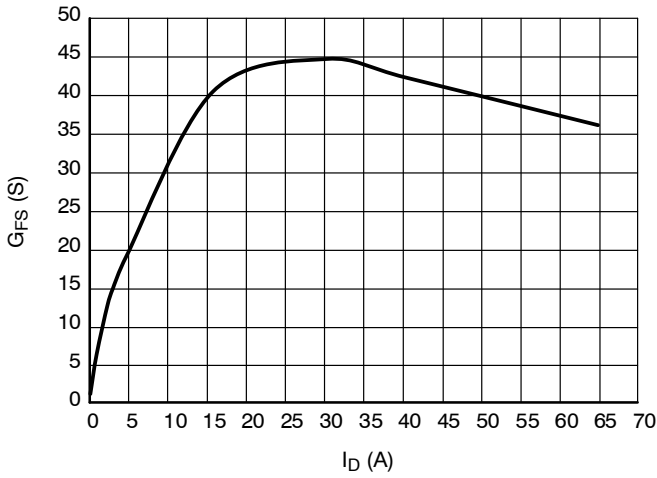
Figure 13. G_{FS} vs. I_D
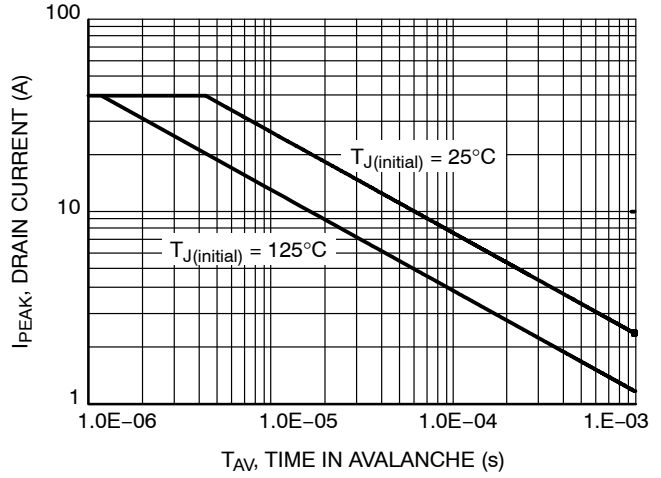
Figure 14. Avalanche Characteristics

ORDERING INFORMATION

Device	Package	Shipping[†]
NVTFS4C13NTAG	WDFN8 (Pb−Free)	1500 / Tape & Reel
NVTFS4C13NWFTAG	WDFN8 (Pb−Free)	1500 / Tape & Reel
NVTFS4C13NTWG	WDFN8 (Pb−Free)	5000 / Tape & Reel
NVTFS4C13NWFTWG	WDFN8 (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.

WDFN8 3.3x3.3, 0.65P
CASE 511AB
ISSUE D

DATE 23 APR 2012

SCALE 2:1

TOP VIEW

SIDE VIEW — DETAIL A

DETAIL A

BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	---	0.05	0.000	---	0.002
b	0.23	0.30	0.40	0.009	0.012	0.016
c	0.15	0.20	0.25	0.006	0.008	0.010
D	3.30 BSC			0.130 BSC		
D1	2.95	3.05	3.15	0.116	0.120	0.124
D2	1.98	2.11	2.24	0.078	0.083	0.088
E	3.30 BSC			0.130 BSC		
E1	2.95	3.05	3.15	0.116	0.120	0.124
E2	1.47	1.60	1.73	0.058	0.063	0.068
E3	0.23	0.30	0.40	0.009	0.012	0.016
e	0.65 BSC			0.026 BSC		
G	0.30	0.41	0.51	0.012	0.016	0.020
K	0.65	0.80	0.95	0.026	0.032	0.037
L	0.30	0.43	0.56	0.012	0.017	0.022
L1	0.06	0.13	0.20	0.002	0.005	0.008
M	1.40	1.50	1.60	0.055	0.059	0.063
θ	0 °	---	12 °	0 °	---	12 °
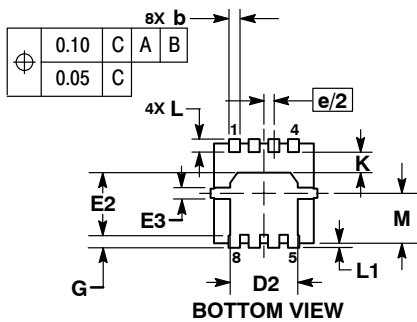
GENERIC MARKING DIAGRAM*

1
XXXXX
AYWW■
■

XXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
■ = Pb–Free Package

*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.

SOLDERING FOOTPRINT*

PACKAGE OUTLINE

8X 0.42
0.65 PITCH
4X 0.66
0.75
0.57
3.60
2.30
0.47
2.37
3.46

DIMENSION: MILLIMETERS
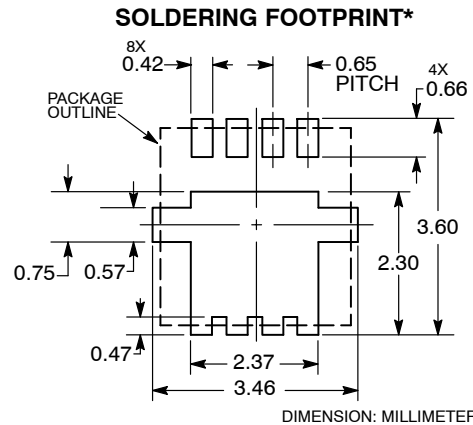
*For additional information on our Pb–Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

◊

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for MOSFET *category:*

Click to view products by ON Semiconductor *manufacturer:*

Other Similar products are found below :

614233C 648584F IRFD120 JANTX2N5237 FCA20N60_F109 FDZ595PZ 2SK2545(Q,T) 405094E 423220D TPCC8103,L1Q(CM MIC4420CM-TR VN1206L SBVS138LT1G 614234A 715780A NTNS3166NZT5G SSM6J414TU,LF(T 751625C BUK954R8-60E NTE6400 SQJ402EP-T1-GE3 2SK2614(TE16L1,Q) 2N7002KW-FAI DMN1017UCP3-7 EFC2J004NUZTDG ECH8691-TL-W FCAB21350L1 P85W28HP2F-7071 DMN1053UCP4-7 NTE221 NTE222 NTE2384 NTE2903 NTE2941 NTE2945 NTE2946 NTE2960 NTE2967 NTE2969 NTE2976 NTE455 NTE6400A NTE2910 NTE2916 NTE2956 NTE2911 DMN2080UCB4-7 TK10A80W,S4X(S SSM6P69NU,LF DMP22D4UFO-7B