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MOSFET - N-Channel Shielded Gate PowerTrench®

150 V, 31 mΩ, 31 A

NTMFS034N15MC

ON Semiconductor®

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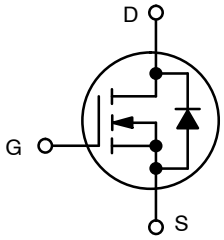
$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
150 V	31 mΩ @ 10 V	31 A

Features

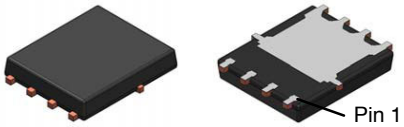
- Small Footprint (5 x 6 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low QG and Capacitance to Minimize Driver Losses
- 100% UIL Tested
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Synchronous Rectification
- AC−DC and DC−DC Power Supplies
- AC−DC Adapters (USB PD) SR
- Load Switch



N−CHANNEL MOSFET



Power 56 (PQFN8) CASE 483AE

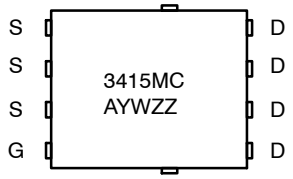
MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	150	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State	T_C = 25°C	I_D	31	A
Power Dissipation $R_{\theta JC}$ (Note 2)	Steady State	T_C = 25°C	P_D	62.5	W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	I_D	6.1	A
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	P_D	2.5	W
Pulsed Drain Current	T_C = 25°C, t_p = 100 μs		I_{DM}	131	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +150	°C
Single Pulse Drain−to−Source Avalanche Energy (I_L = 6 A_{pk}, L = 3 mH)			E_{AS}	54	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. Surface−mounted on FR4 board using a 1 in^2, 2 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

MARKING DIAGRAM



3415MC = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping†
NTMFS034N15MC (Pb−Free/Halogen Free)	Power 56 (PQFN8)	3000 / 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.

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THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State (Note 2)	$R_{\theta JC}$	2.0	°C/W
Junction−to−Ambient − Steady State (Notes 1, 2)	$R_{\theta JA}$	50	

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		150			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			86		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 120 V	T_J = 25°C			1.0	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 70 μA		2.5		4.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	I_D = 70 μA, ref to 25°C			−7.7		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 13 A			25	31	mΩ
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 8 V, I_D = 6 A			27	36.5	mΩ
Forward Transconductance	g_{FS}	V_{DS} = 10 V, I_D = 13 A			27		S
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 75 V			905		pF
Output Capacitance	C_{OSS}				270		
Reverse Transfer Capacitance	C_{RSS}				5		
Gate−Resistance	R_G				0.6	1.2	Ω
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 75 V; I_D = 13 A			12		nC
Threshold Gate Charge	$Q_{G(TH)}$				3.1		
Gate−to−Source Charge	Q_{GS}				4.8		
Gate−to−Drain Charge	Q_{GD}				1.8		
Plateau Voltage	V_{GP}				5.4		V
Output Charge	Q_{OSS}	V_{DD} = 75 V, V_{GS} = 0 V			32		nC
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DD} = 75 V, I_D = 13 A, R_G = 6 Ω			12		ns
Rise Time	t_r				2.2		
Turn−Off Delay Time	$t_{d(OFF)}$				14		
Fall Time	t_f				2.5		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 13 A	T_J = 25°C		0.87	1.2	V
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, V_{DD} = 75 V dI_S/dt = 300 A/μs, I_S = 13 A			41		ns
Reverse Recovery Charge	Q_{RR}				126		nC
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, V_{DD} = 75 V dI_S/dt = 1000 A/μs, I_S = 13 A			22		ns
Reverse Recovery Charge	Q_{RR}				164		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.

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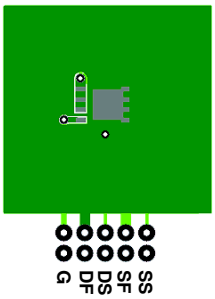
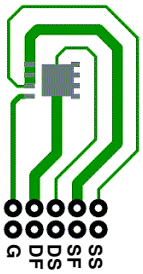
NOTES:

3. Switching characteristics are independent of operating junction temperatures.
4. $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5 × 1.5 in. board of FR−4 material. $R_{\theta CA}$ is determined by the user's board design.



a) 50°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.

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TYPICAL CHARACTERISTICS

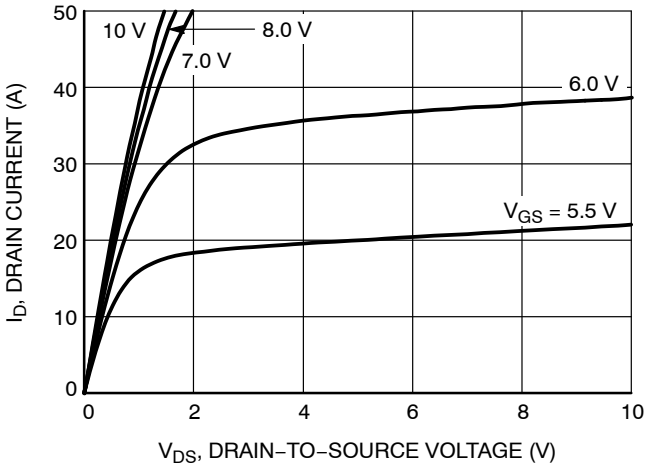

Figure 1. On−Region Characteristics

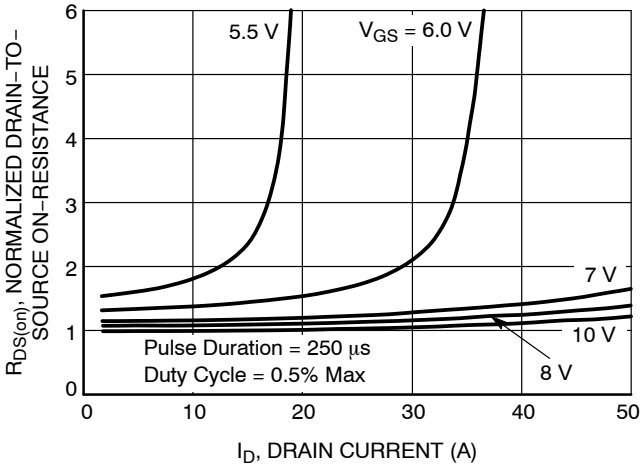

Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

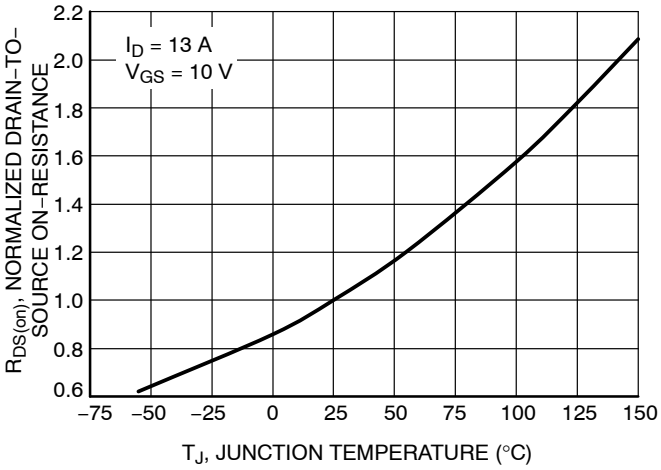

Figure 3. Normalized On−Resistance vs. Junction Temperature

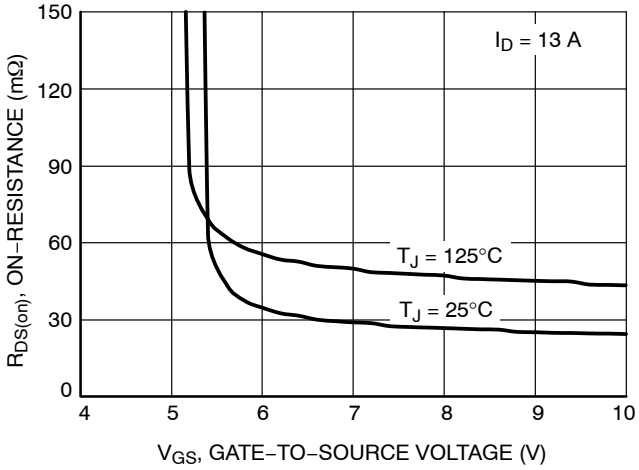

Figure 4. On−Resistance vs. Gate−to−Source Voltage

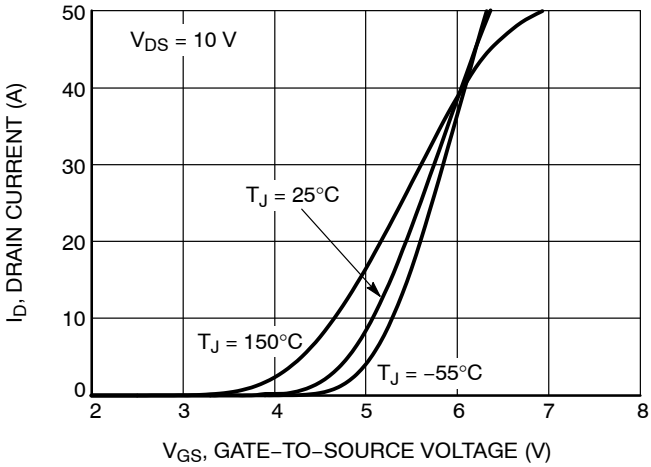

Figure 5. Transfer Characteristics

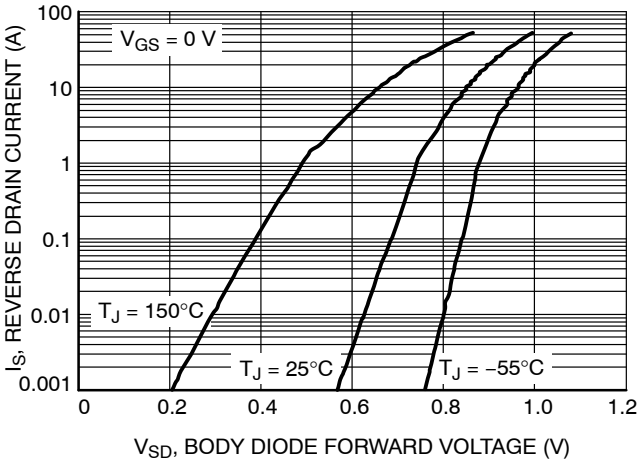

Figure 6. Source−to−Drain Diode Forward Voltage vs. Source Current

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TYPICAL CHARACTERISTICS

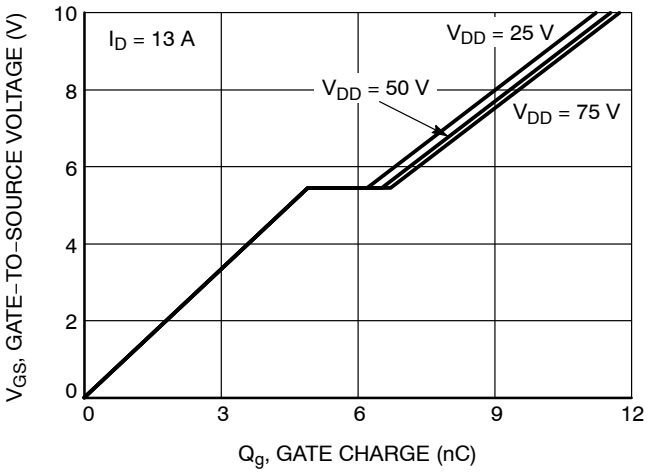

Figure 7. Gate Charge Characteristics

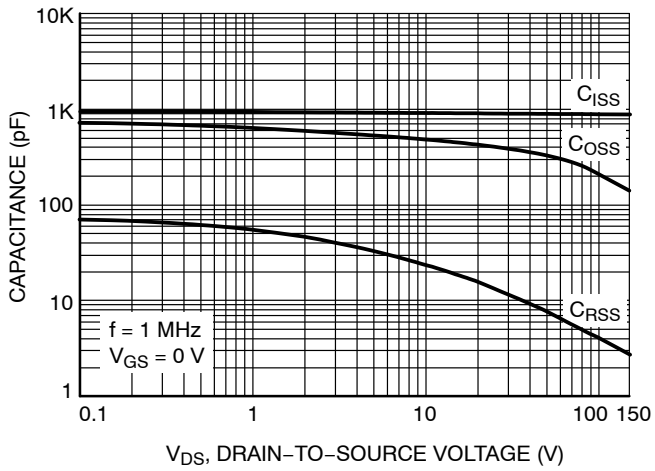

Figure 8. Capacitance vs. Drain−to−Source Voltage

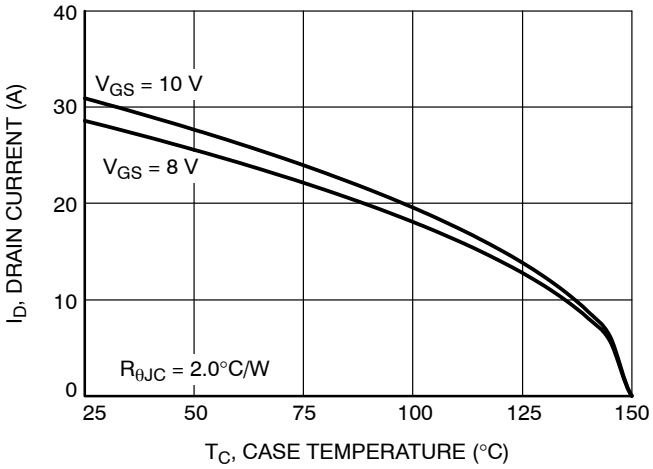

Figure 9. Drain Current vs. Case Temperature

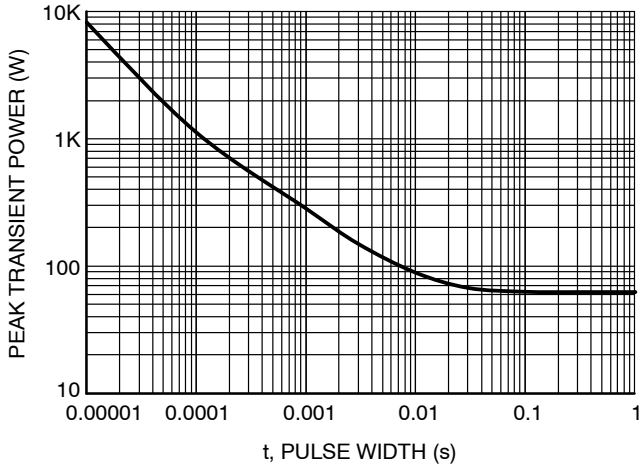

Figure 10. Peak Power

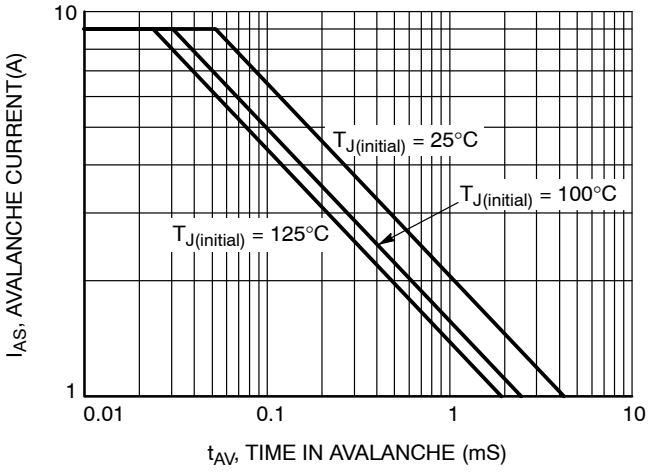

Figure 11. Unclamped Inductive Switching Capability

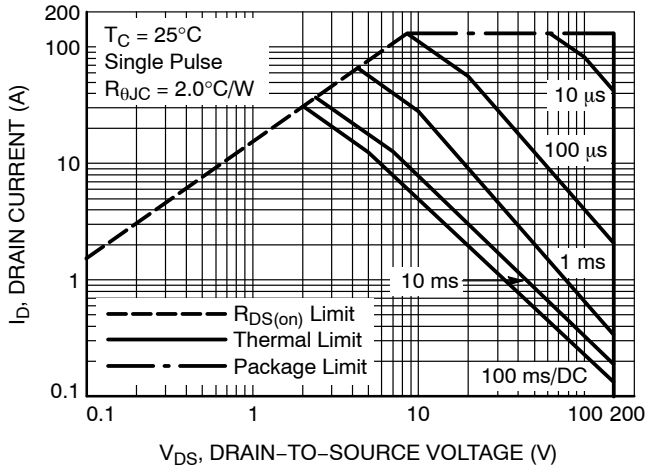

Figure 12. Forward Bias Safe Operating Area

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TYPICAL CHARACTERISTICS

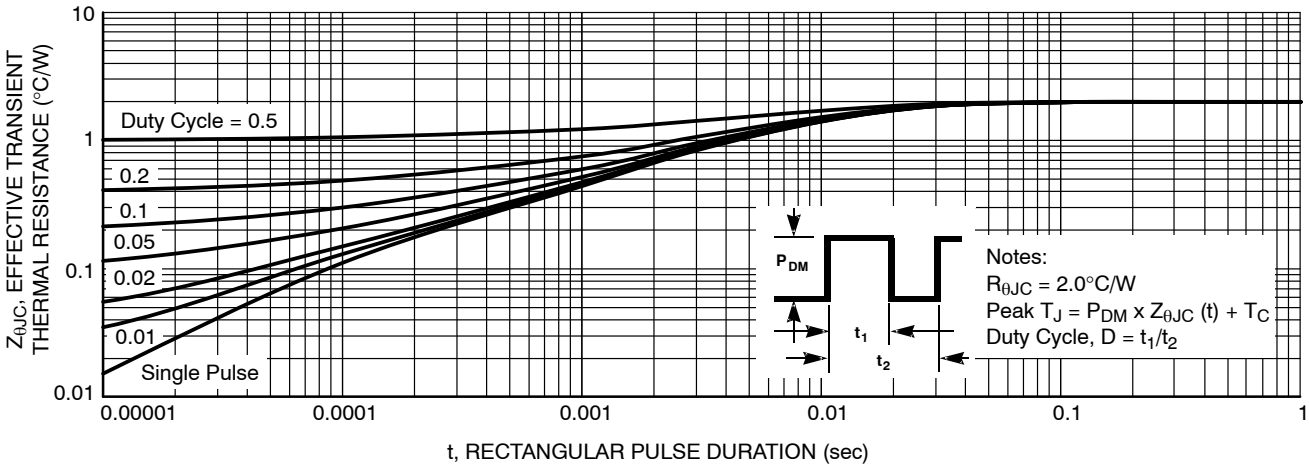

Figure 13. Transient Thermal Impedance

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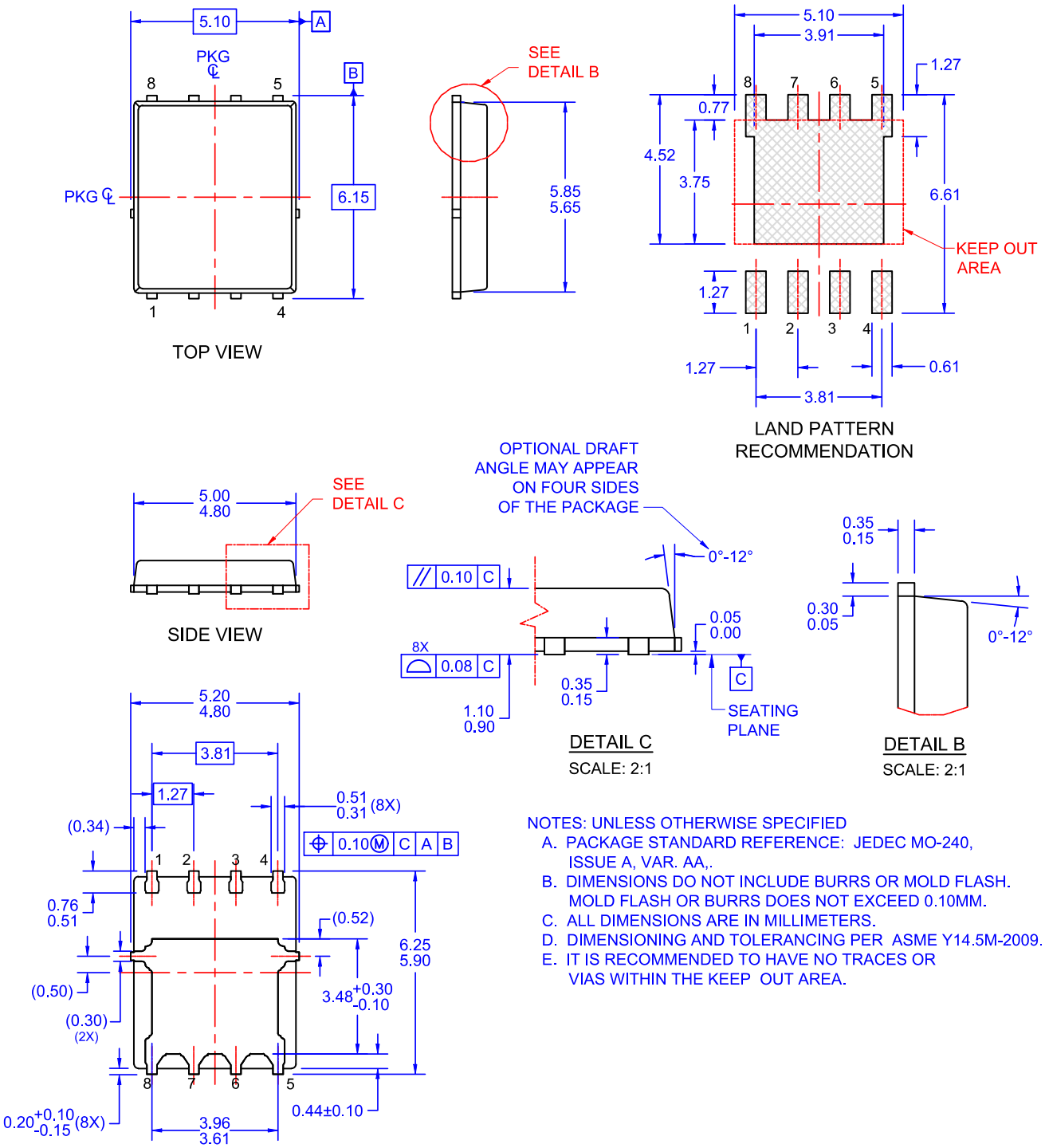
PACKAGE DIMENSIONS

PQFN8 5X6, 1.27P
CASE 483AE
ISSUE A



NOTES: UNLESS OTHERWISE SPECIFIED

A. PACKAGE STANDARD REFERENCE: JEDEC MO-240, ISSUE A, VAR. AA,.
B. DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2009.
E. IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.

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