

NTMT110N65S3F

Product Preview

N-Channel SUPERFET[®] III FRFET[®] MOSFET

650 V, 30 A, 110 mΩ

Description

SUPERFET III MOSFET is ON Semiconductor's brand-new high voltage super-junction (SJ) MOSFET family that is utilizing charge balance technology for outstanding low on-resistance and lower gate charge performance. This technology is tailored to minimize conduction loss, provides superior switching performance, dv/dt rate and higher avalanche energy. Consequently, SUPERFET III MOSFET is very suitable for the switching power applications such as server/telecom power, adapter and solar inverter applications.

The Power88 package is an ultra-slim surface-mount package (1 mm high) with a low profile and small footprint (8 x 8 mm²). SUPERFET III MOSFET in a Power88 package offers excellent switching performance due to lower parasitic source inductance and separated power and drive sources. Power88 offers Moisture Sensitivity Level 1 (MSL 1).

Features

- 700 V @ T_J = 150°C
- Typ. R_{DS(on)} = 98 mΩ
- Ultra Low Gate Charge (Typ. Q_g = 58 nC)
- Low Effective Output Capacitance (Typ. C_{oss(eff.)} = 553 pF)
- 100% Avalanche Tested
- These Devices are Pb-Free and are RoHS Compliant

Applications

- Telecom / Server Power Supplies
- Industrial Power Supplies
- EV Charger
- UPS / Solar

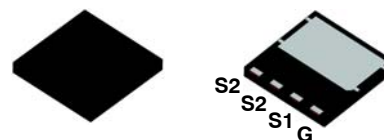
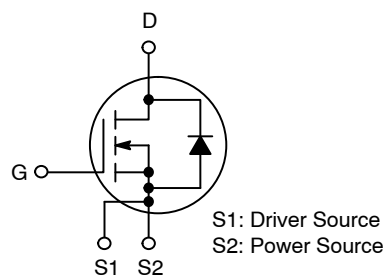
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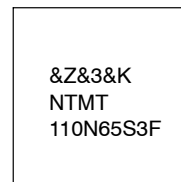
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V _{DSS}	R _{DS(ON)} TYP	I _D MAX
650 V	98 mΩ	30 A



Power88
PQFN4
CASE 483AP

MARKING DIAGRAM



&Z = Assembly Plant Code
&3 = Data Code (Year & Week)
&K = Lot
NTMT110N65S3F = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

NTMT110N65S3F

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, Unless otherwise noted)

Symbol	Parameter	NTMT110N65S3F	Unit
V _{DSS}	Drain to Source Voltage	650	V
V _{GSS}	Gate to Source Voltage	- DC	±30
		- AC (f > 1 Hz)	±30
I _D	Drain Current	- Continuous (T _C = 25°C)	30
		- Continuous (T _C = 100°C)	19.5
I _{DM}	Drain Current	- Pulsed (Note 1)	69
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	380	mJ
I _{AS}	Avalanche Current (Note 2)	4.4	A
E _{AR}	Repetitive Avalanche Energy (Note 1)	2.4	mJ
dv/dt	MOSFET dv/dt	100	V/ns
	Peak Diode Recovery dv/dt (Note 3)	50	
P _D	Power Dissipation	(T _C = 25°C)	240
		- Derate Above 25°C	1.92
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T _L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 seconds	300	°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. Repetitive rating: pulse-width limited by maximum junction temperature.
2. I_{AS} = 4.4 A, R_G = 25 Ω, starting T_J = 25°C.
3. I_{SD} ≤ 15 A, di/dt ≤ 100 A/μs, V_{DD} ≤ 400 V, starting T_J = 25°C.

THERMAL CHARACTERISTICS

Symbol	Parameter	NTMT110N65S3F	Unit
R _{θJC}	Thermal Resistance, Junction to Case, Max.	0.52	°C/W
R _{θJA}	Thermal Resistance, Junction to Ambient (* 1 in ² Pad of 2-oz Copper), Max.	45	

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Marking	Package	Packing Method	Reel Size	Tape Width	Quantity
NTMT110N65S3F	NTMT110N65S3F	Power88	Tape & Reel	13"	13.3 mm	3000 Units

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ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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OFF CHARACTERISTICS

BV _{DSS}	Drain to Source Breakdown Voltage	V _{GS} = 0 V, I _D = 1 mA, T _J = 25°C	650	–	–	V
		V _{GS} = 0 V, I _D = 1 mA, T _J = 150°C	700	–	–	V
ΔBV _{DSS} /ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 15 mA, Referenced to 25°C	–	0.64	–	V/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650 V, V _{GS} = 0 V	–	–	10	μA
		V _{DS} = 520 V, T _C = 125°C	–	97	–	
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±30 V, V _{DS} = 0 V	–	–	±100	nA

ON CHARACTERISTICS

V _{GS(th)}	Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 3 mA	3.0	–	5.0	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 15 A	–	98	110	mΩ
g _{FS}	Forward Transconductance	V _{DS} = 20 V, I _D = 15 A	–	17	–	S

DYNAMIC CHARACTERISTICS

C _{iss}	Input Capacitance	V _{DS} = 400 V, V _{GS} = 0 V, f = 1 MHz	–	2560	–	pF
C _{oss}	Output Capacitance		–	50	–	pF
C _{oss(eff.)}	Effective Output Capacitance	V _{DS} = 0 V to 400 V, V _{GS} = 0 V	–	553	–	pF
C _{oss(er.)}	Energy Related Output Capacitance	V _{DS} = 0 V to 400 V, V _{GS} = 0 V	–	83	–	pF
Q _{g(tot)}	Total Gate Charge at 10V	V _{DS} = 400 V, I _D = 15 A, V _{GS} = 10 V (Note 4)	–	58	–	nC
Q _{gs}	Gate to Source Gate Charge		–	19	–	nC
Q _{gd}	Gate to Drain "Miller" Charge		–	23	–	nC
ESR	Equivalent Series Resistance	f = 1 MHz	–	2	–	Ω

SWITCHING CHARACTERISTICS

t _{d(on)}	Turn-On Delay Time	V _{DD} = 400 V, I _D = 15 A, V _{GS} = 10 V, R _g = 4.7 Ω (Note 4)	–	29	–	ns
t _r	Turn-On Rise Time		–	32	–	ns
t _{d(off)}	Turn-Off Delay Time		–	61	–	ns
t _f	Turn-Off Fall Time		–	16	–	ns

SOURCE-DRAIN DIODE CHARACTERISTICS

I _S	Maximum Continuous Source to Drain Diode Forward Current	–	–	30	A	
I _{SM}	Maximum Pulsed Source to Drain Diode Forward Current	–	–	69	A	
V _{SD}	Source to Drain Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 15 A	–	–	1.3	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 15 A, dI _F /dt = 100 A/μs	–	94	–	ns
Q _{rr}	Reverse Recovery Charge		–	343	–	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.

4. Essentially independent of operating temperature typical characteristics.

TYPICAL PERFORMANCE CHARACTERISTICS

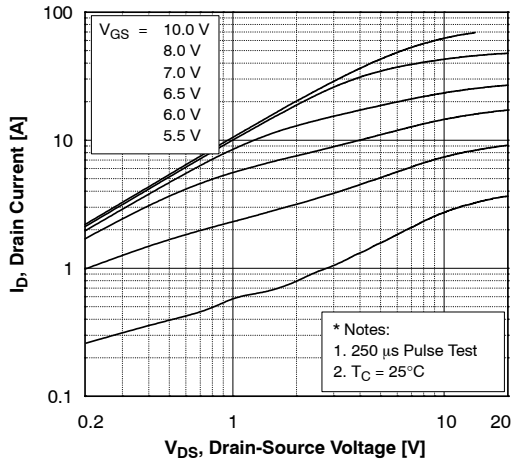


Figure 1. On-Region Characteristics

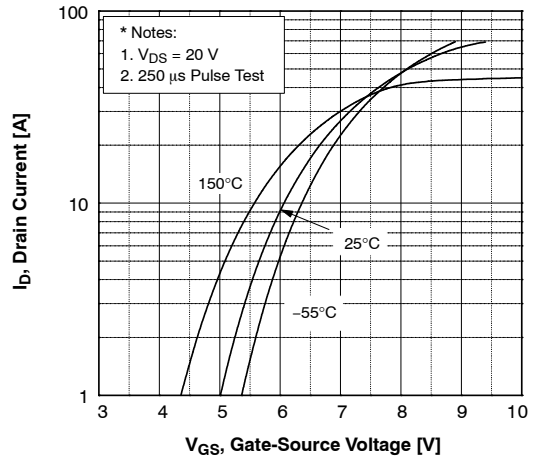


Figure 2. Transfer Characteristics

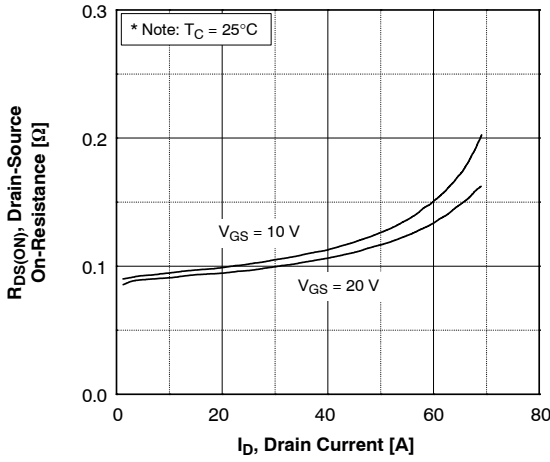


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

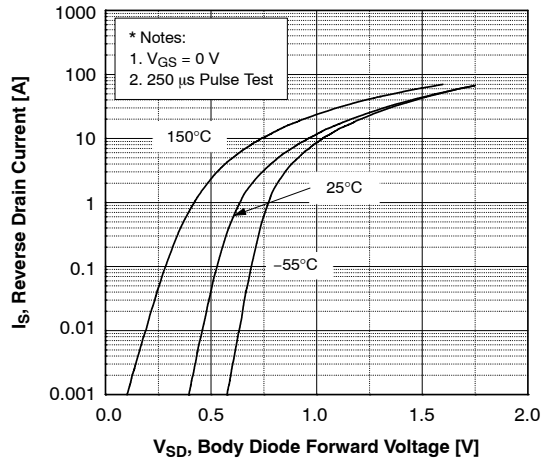


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

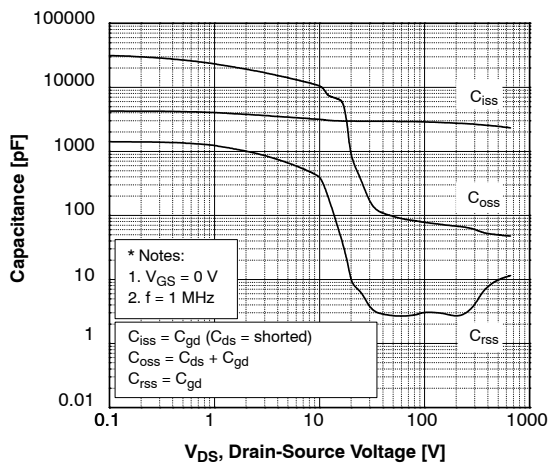


Figure 5. Capacitance Characteristics

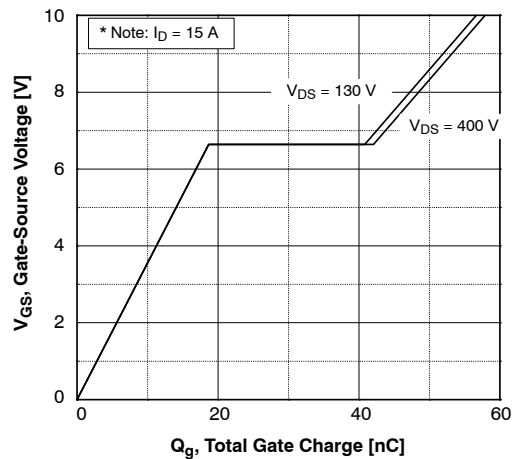


Figure 6. Gate Charge Characteristics

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

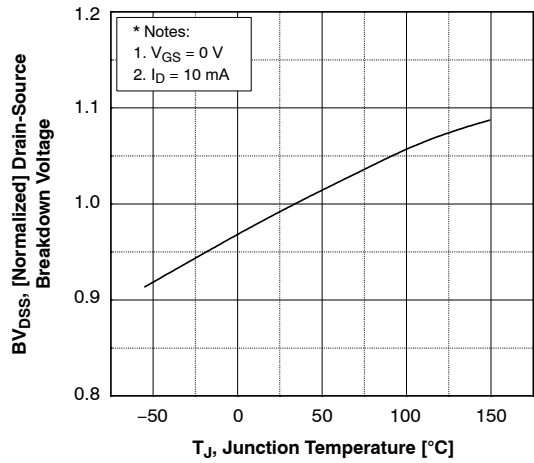


Figure 7. Breakdown Voltage Variation vs. Temperature

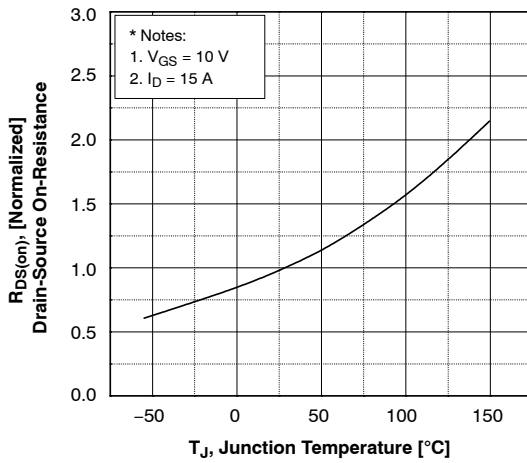


Figure 8. On-Resistance Variant vs. Temperature

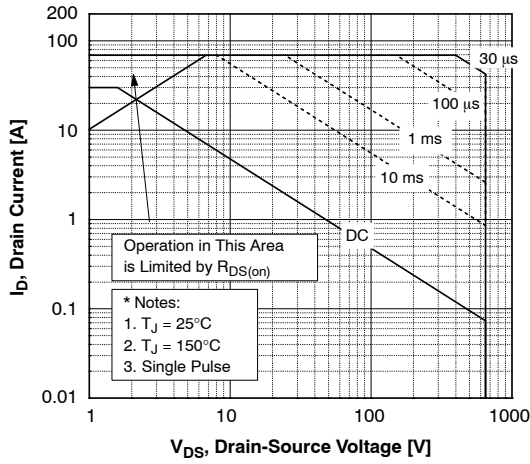


Figure 9. Maximum Safe Operation Area

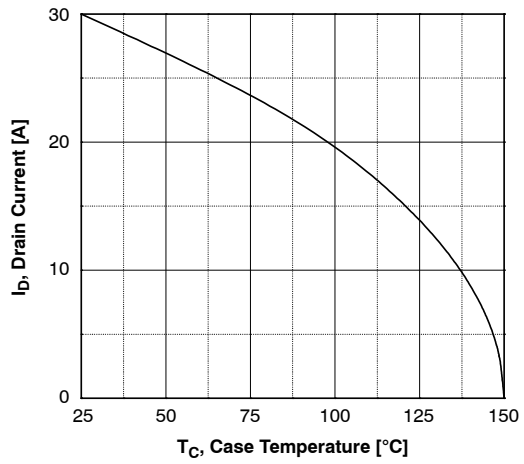


Figure 10. Maximum Drain Current vs. Case Temperature

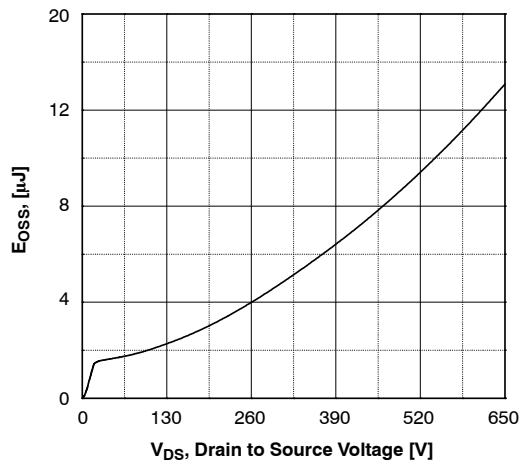


Figure 11. E_{OSS} vs. Drain to Source Voltage

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TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

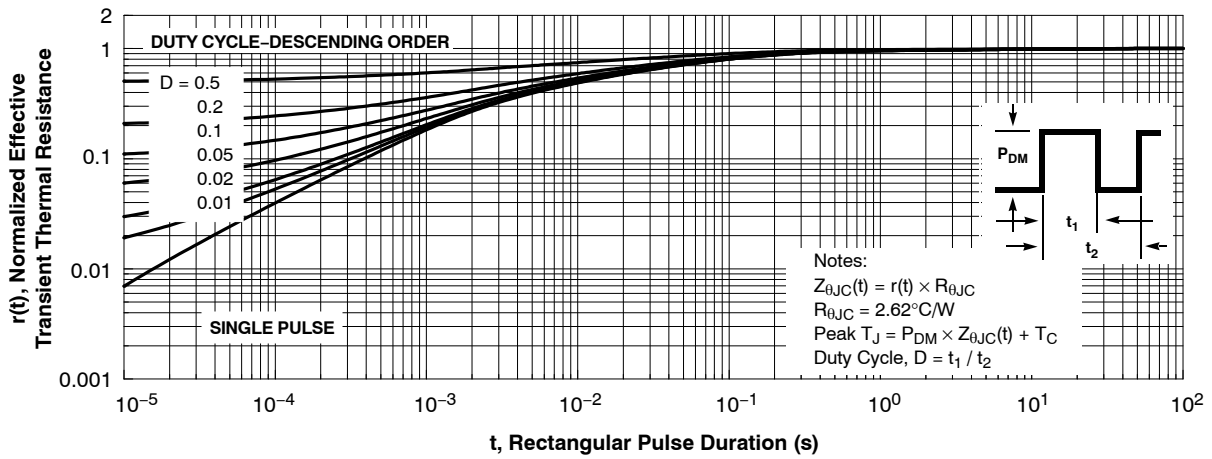


Figure 12. Transient Thermal Response Curve

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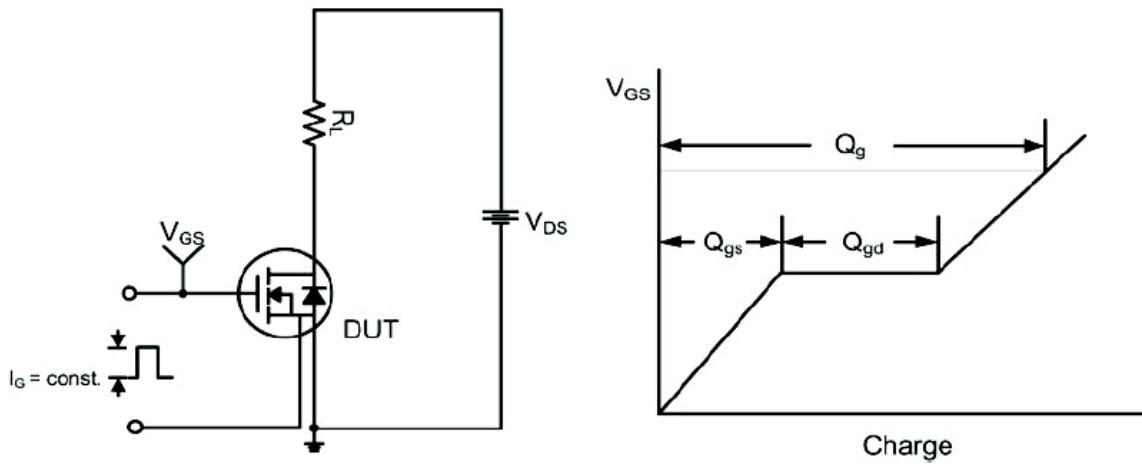


Figure 13. Gate Charge Test Circuit & Waveform

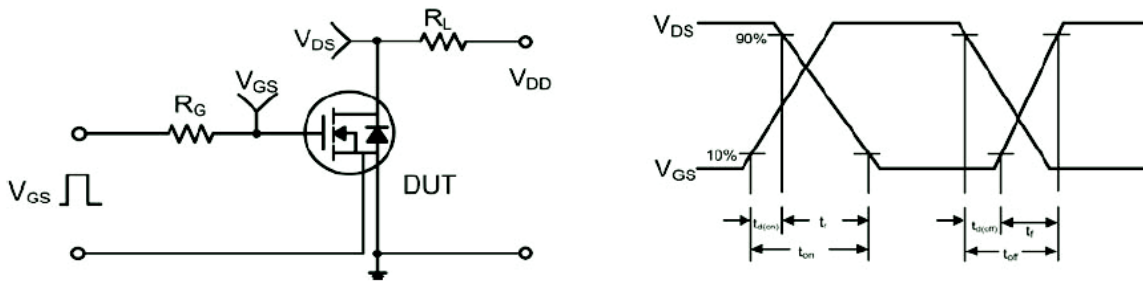


Figure 14. Resistive Switching Test Circuit & Waveforms

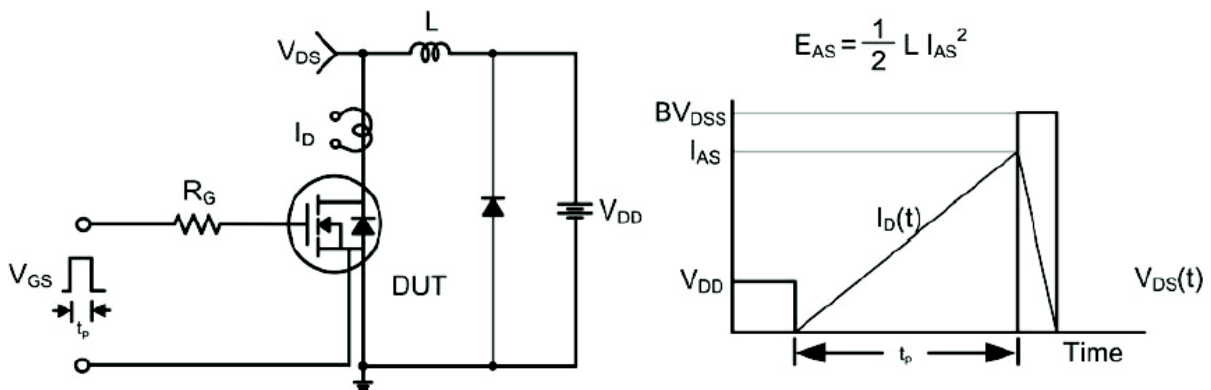


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

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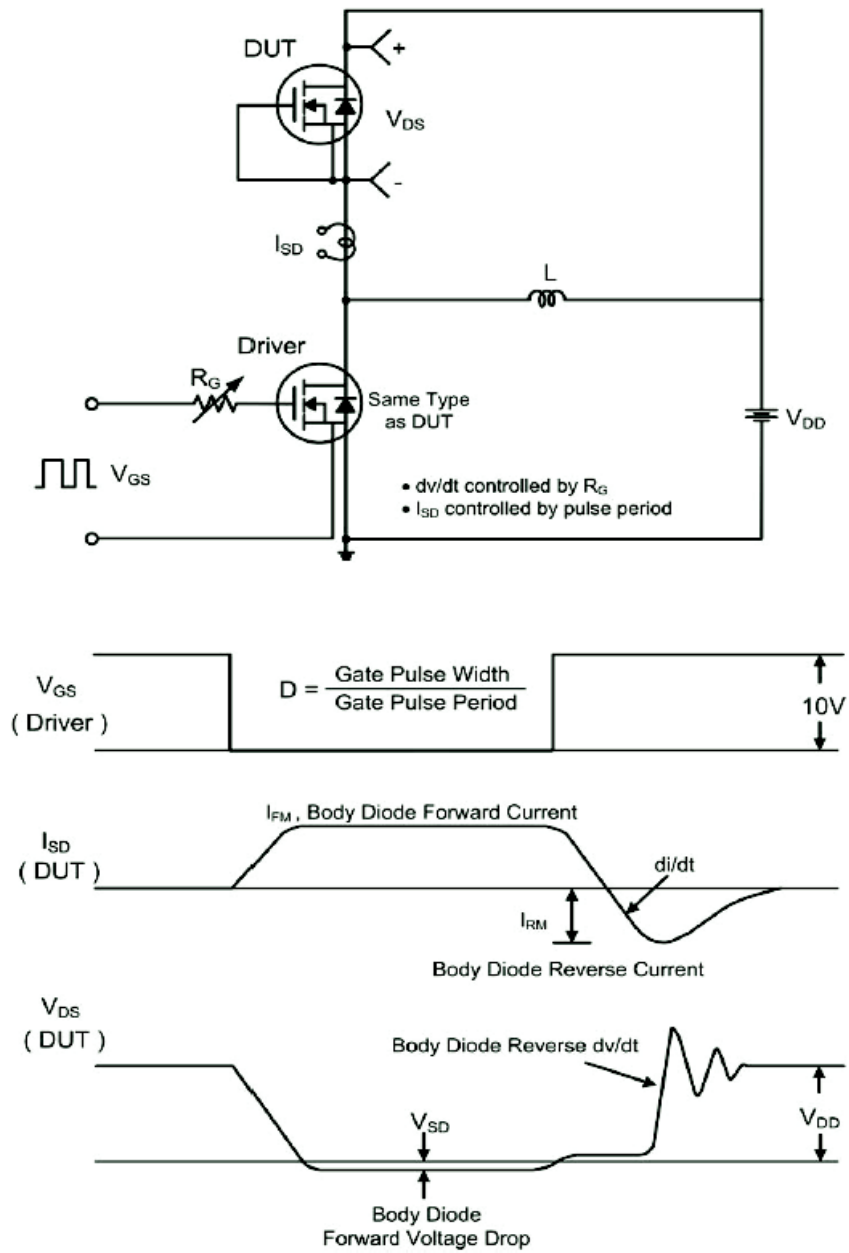
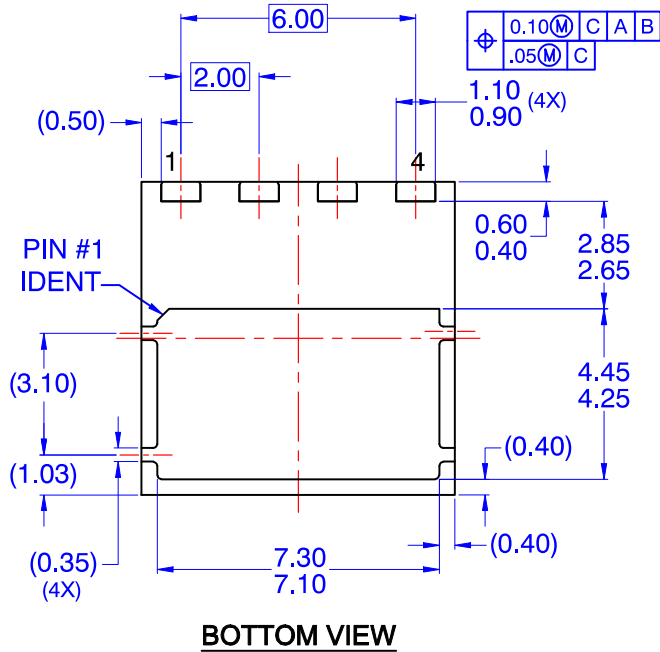
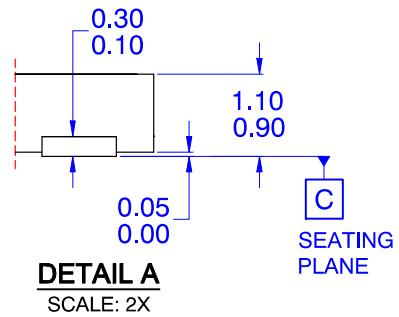
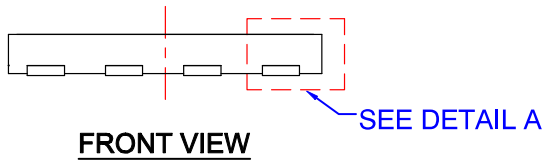
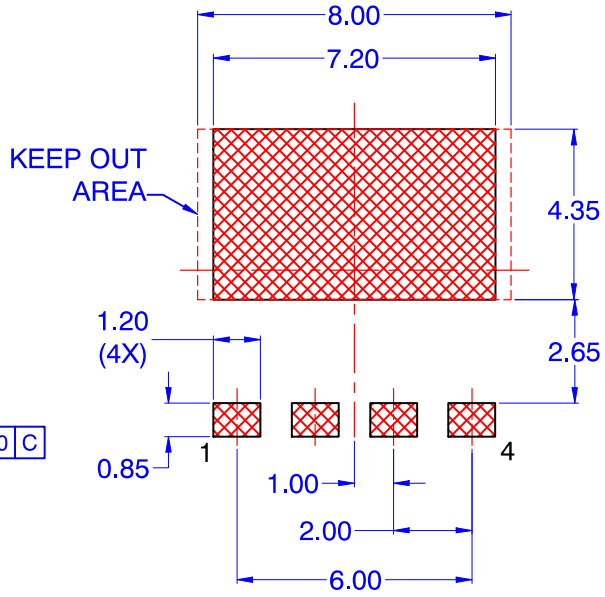
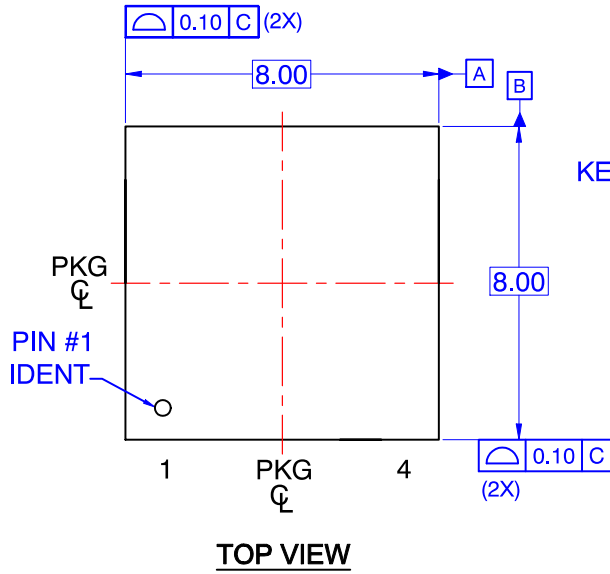


Figure 16. Peak Diode Recovery dv/dt Test Circuit & Waveforms

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PACKAGE DIMENSIONS


PQFN4 8X8, 2P
CASE 483AP
ISSUE O



NOTES: UNLESS OTHERWISE SPECIFIED
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C) ALL DIMENSIONS ARE IN MILLIMETERS.
D) DRAWING CONFORMS TO ASME Y14.5M-1994.

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