

# MOSFET – Power, N-Channel, SUPERFET® III, FAST

**650 V, 64 mΩ, 40 A**

## NTMT064N65S3H

### Description

SUPERFET III MOSFET is onsemi'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 advanced technology is tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate. Consequently, SUPERFET III FAST MOSFET is suitable for various AC/DC power conversion for system miniaturization and higher efficiency.

The Power88 package is an ultra-slim surface-mount package (1 mm high) with a low profile and small footprint (8 x 8 mm<sup>2</sup>). 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).

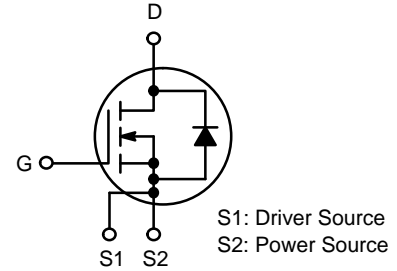
### Features

- 700 V @ T<sub>J</sub> = 150 °C
- Typ. R<sub>DS(on)</sub> = 52 mΩ
- Ultra Low Gate Charge (Typ. Q<sub>g</sub> = 82 nC)
- Low Effective Output Capacitance (Typ. C<sub>oss(eff.)</sub> = 750 pF)
- 100% Avalanche Tested
- These Devices are Pb-Free and are RoHS Compliant

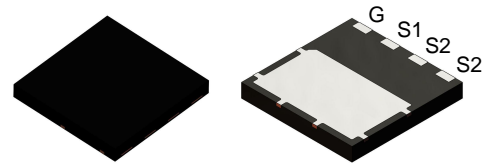
### Applications

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

V <sub>DSS</sub>	R <sub>DS(ON)</sub> MAX	I <sub>D</sub> MAX
650 V	64 mΩ @ 10 V	40 A

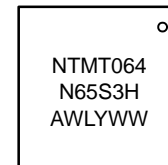


POWER MOSFET



TDFN4 8X8 2P  
CASE 520AB

### MARKING DIAGRAM



NTMT064N65S3H = Specific Device Code  
 A = Assembly Location  
 WL = Wafer Lot  
 Y = Year  
 WW = Work Week

### ORDERING INFORMATION

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

# NTMT064N65S3H

## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25 °C, Unless otherwise noted)

Symbol	Parameter	Value	Unit
V <sub>DSS</sub>	Drain to Source Voltage	650	V
V <sub>GSS</sub>	Gate to Source Voltage	- DC	±30
		- AC (f > 1 Hz)	±30
I <sub>D</sub>	Drain Current	- Continuous (T <sub>C</sub> = 25 °C)	40
		- Continuous (T <sub>C</sub> = 100 °C)	25
I <sub>DM</sub>	Drain Current	- Pulsed (Note 1)	112
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)	422	mJ
I <sub>AS</sub>	Avalanche Current (Note 2)	6.5	A
E <sub>AR</sub>	Repetitive Avalanche Energy (Note 1)	2.60	mJ
dv/dt	MOSFET dv/dt	120	V/ns
	Peak Diode Recovery dv/dt (Note 3)	20	
P <sub>D</sub>	Power Dissipation	(T <sub>C</sub> = 25 °C)	260
		- Derate Above 25 °C	2.08
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C
T <sub>L</sub>	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 seconds	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. Repetitive rating: pulse-width limited by maximum junction temperature.
2. I<sub>AS</sub> = 6.5 A, R<sub>G</sub> = 25 Ω, starting T<sub>J</sub> = 25 °C.
3. I<sub>SD</sub> ≤ 20 A, di/dt ≤ 200 A/μs, V<sub>DD</sub> ≤ 400 V, starting T<sub>J</sub> = 25 °C.

## THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
R <sub>θJC</sub>	Thermal Resistance, Junction to Case, Max.	0.48	°C/W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient, Max. (Note 4)	45	

4. Device on 1 in<sup>2</sup> pad 2 oz copper pad on 1.5 x 1.5 in. board of FR-4 material.

## PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Marking	Package	Reel Size	Tape Width	Shipping Quantity <sup>†</sup>
NTMT064N65S3H	NTMT064N65S3H	TDFN4	13"	13.3 mm	3000 Units / Tape & Reel

<sup>†</sup> 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](#).

# NTMT064N65S3H

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25 °C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
--------	-----------	-----------------	------	------	------	------

### OFF CHARACTERISTICS

BV <sub>DSS</sub>	Drain to Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 1 mA, T <sub>J</sub> = 25 °C	650			V
		V <sub>GS</sub> = 0 V, I <sub>D</sub> = 1 mA, T <sub>J</sub> = 150 °C	700			V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> = 10 mA, Referenced to 25 °C		0.63		V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 650 V, V <sub>GS</sub> = 0 V			10	μA
		V <sub>DS</sub> = 520 V, T <sub>C</sub> = 125 °C		3.2		
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>GS</sub> = ±30 V, V <sub>DS</sub> = 0 V			±100	nA

### ON CHARACTERISTICS

V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 3.9 mA	2.4		4.0	V
R <sub>DS(on)</sub>	Static Drain to Source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		52	64	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> = 20 V, I <sub>D</sub> = 20 A		44		S

### DYNAMIC CHARACTERISTICS

C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = 400 V, V <sub>GS</sub> = 0 V, f = 250 kHz		3745		pF
C <sub>oss</sub>	Output Capacitance			58		pF
C <sub>oss(eff.)</sub>	Effective Output Capacitance	V <sub>DS</sub> = 0 V to 400 V, V <sub>GS</sub> = 0 V		750		pF
C <sub>oss(er.)</sub>	Energy Related Output Capacitance	V <sub>DS</sub> = 0 V to 400 V, V <sub>GS</sub> = 0 V		100		pF
Q <sub>g(tot)</sub>	Total Gate Charge at 10 V	V <sub>DS</sub> = 400 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V (Note 5)		82		nC
Q <sub>gs</sub>	Gate to Source Gate Charge			20		nC
Q <sub>gd</sub>	Gate to Drain "Miller" Charge			23		nC
ESR	Equivalent Series Resistance	f = 1 MHz		0.7		Ω

### SWITCHING CHARACTERISTICS

t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = 400 V, I <sub>D</sub> = 20 A, V <sub>GS</sub> = 10 V, R <sub>g</sub> = 4.7 Ω (Note 5)		29		ns
t <sub>r</sub>	Turn-On Rise Time			16		ns
t <sub>d(off)</sub>	Turn-Off Delay Time			85		ns
t <sub>f</sub>	Turn-Off Fall Time			3.1		ns

### SOURCE-DRAIN DIODE CHARACTERISTICS

I <sub>S</sub>	Maximum Continuous Source to Drain Diode Forward Current			40		A
I <sub>SM</sub>	Maximum Pulsed Source to Drain Diode Forward Current			112		A
V <sub>SD</sub>	Source to Drain Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>SD</sub> = 20 A			1.2	V
t <sub>rr</sub>	Reverse Recovery Time	V <sub>DD</sub> = 400 V, I <sub>SD</sub> = 20 A, di <sub>F</sub> /dt = 100 A/μs		367		ns
Q <sub>rr</sub>	Reverse Recovery Charge			6.3		μC

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.

5. Essentially independent of operating temperature typical characteristics.

# NTMT064N65S3H

## TYPICAL CHARACTERISTICS

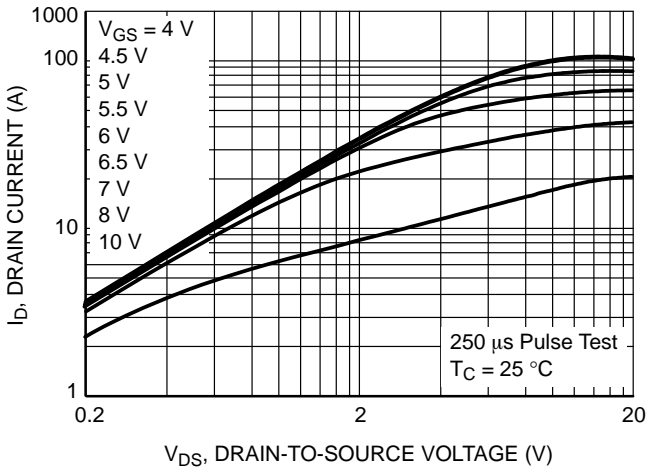


Figure 1. On-Region Characteristics

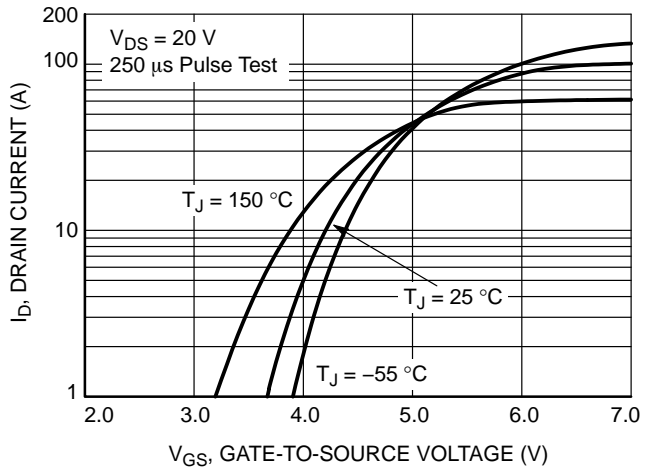


Figure 2. Transfer Characteristics

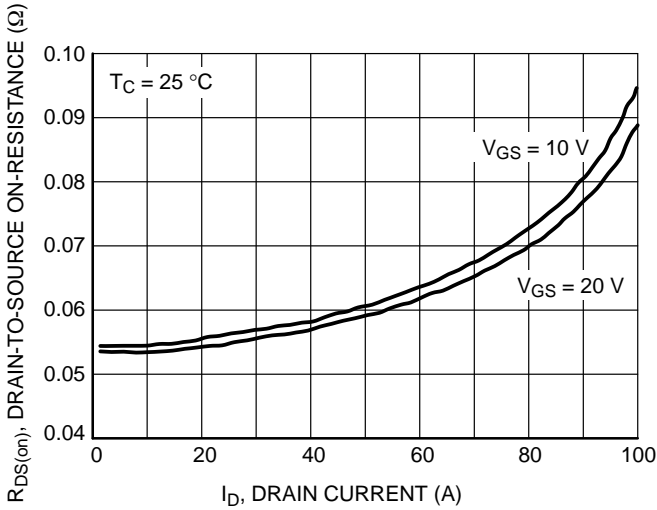


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

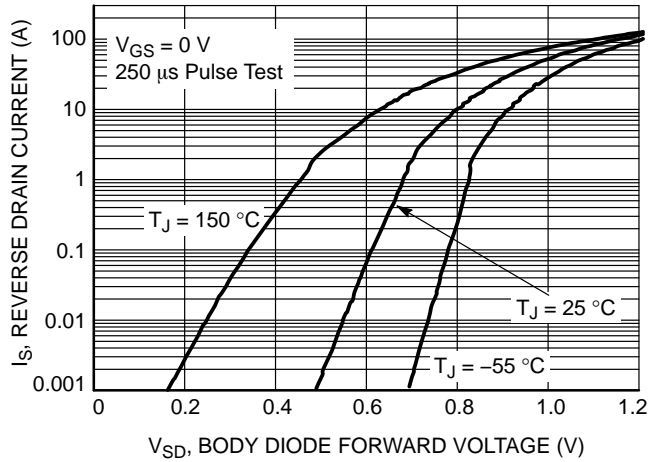


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

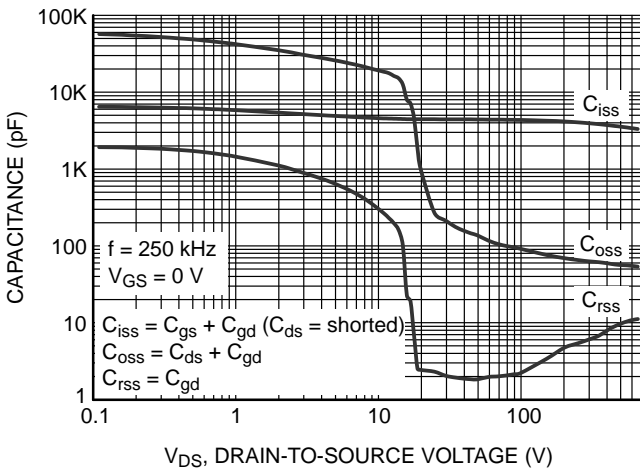


Figure 5. Capacitance Characteristics

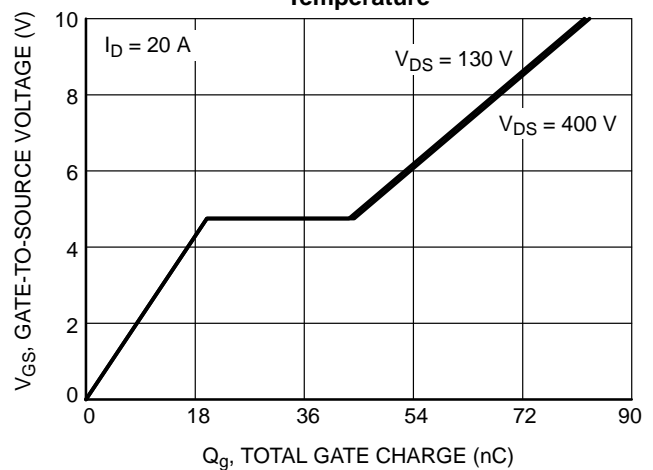
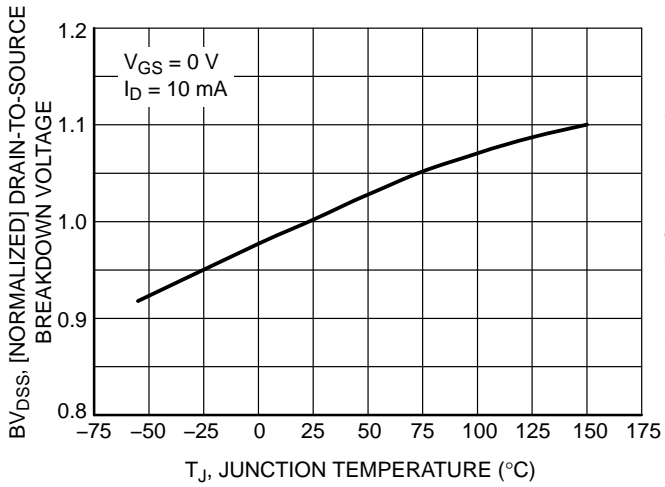


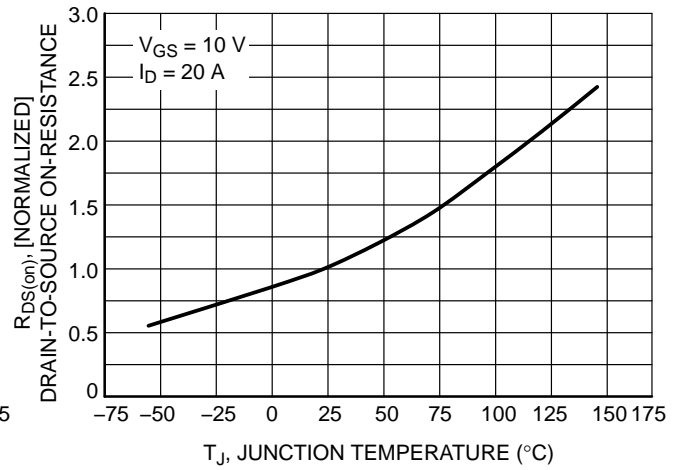
Figure 6. Gate Charge Characteristics

# NTMT064N65S3H

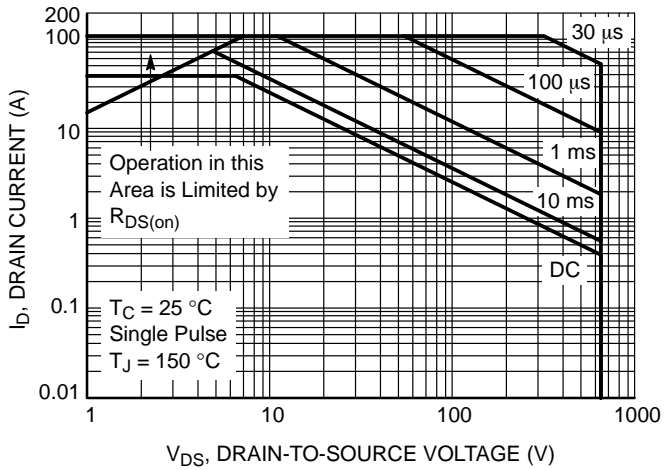
## TYPICAL CHARACTERISTICS



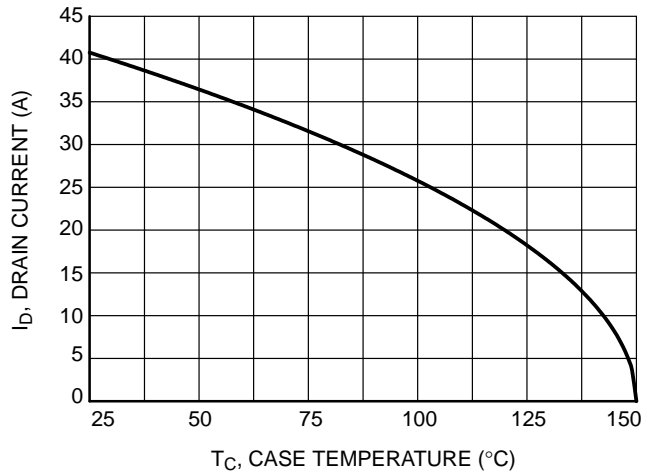
**Figure 7. Breakdown Voltage Variation vs. Temperature**



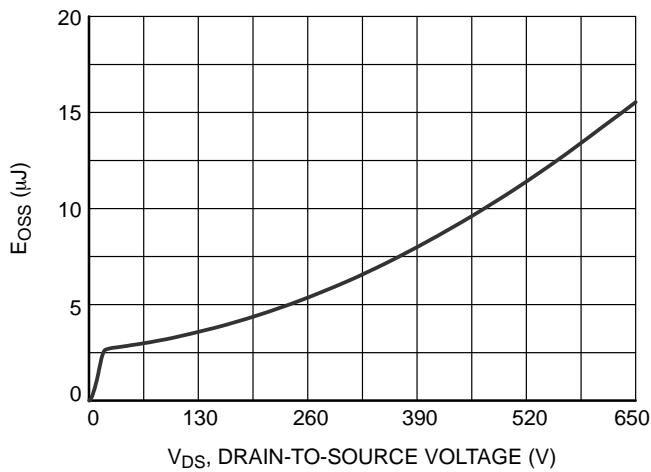
**Figure 8. On-Resistance Variation vs. Temperature**



**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Drain Current vs. Case Temperature**



**Figure 11. E<sub>OSS</sub> vs. Drain-to-Source Voltage**

# NTMT064N65S3H

## TYPICAL CHARACTERISTICS

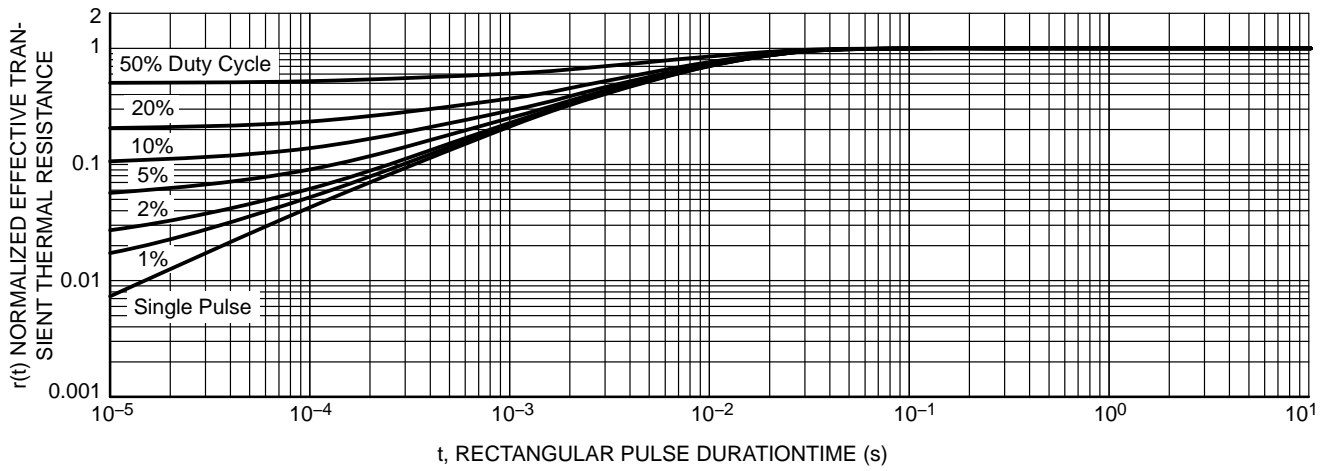


Figure 12. Transient Thermal Response Curve

# NTMT064N65S3H

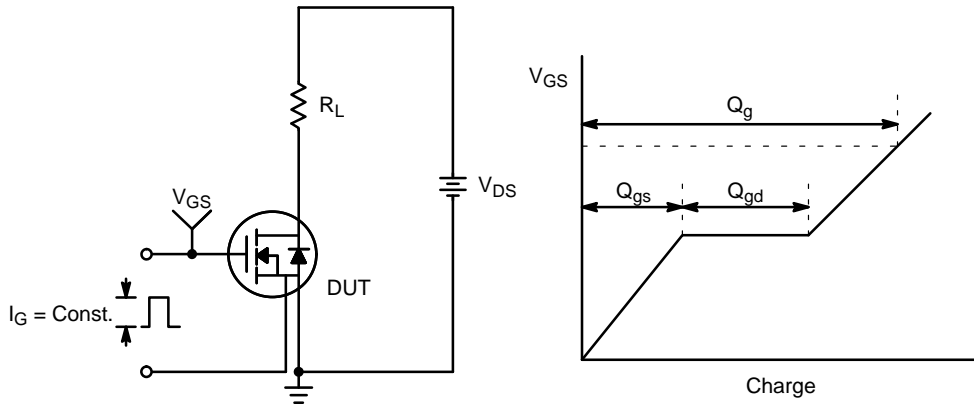


Figure 13. Gate Charge Test Circuit & Waveform

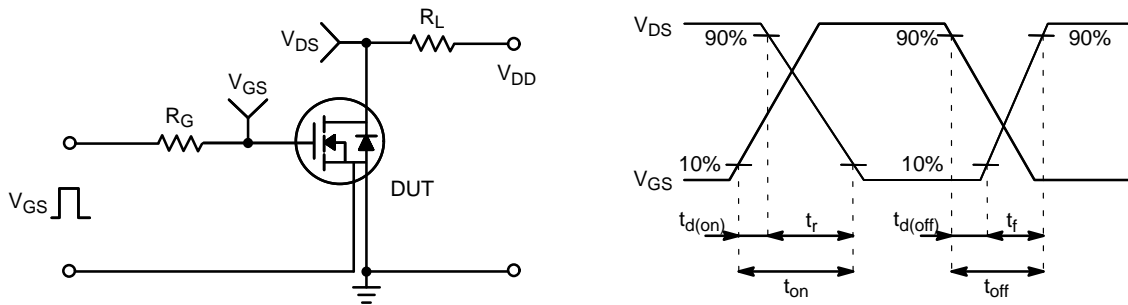


Figure 14. Resistive Switching Test Circuit & Waveforms

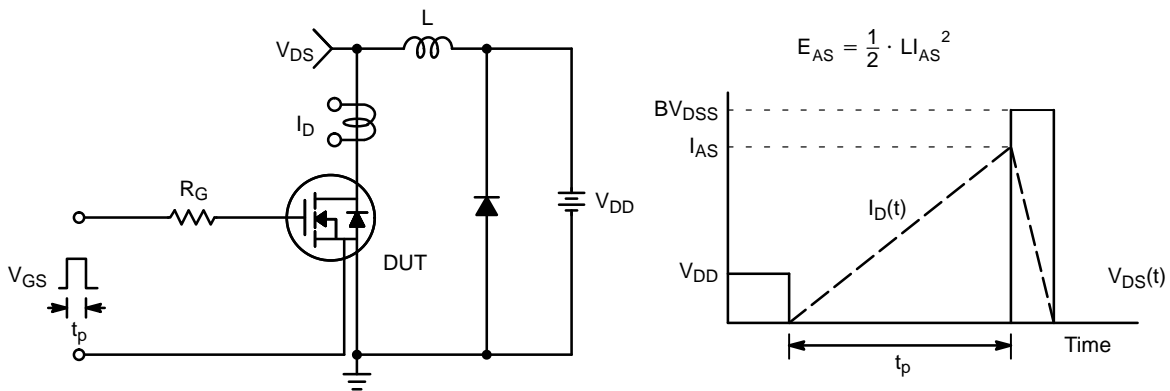
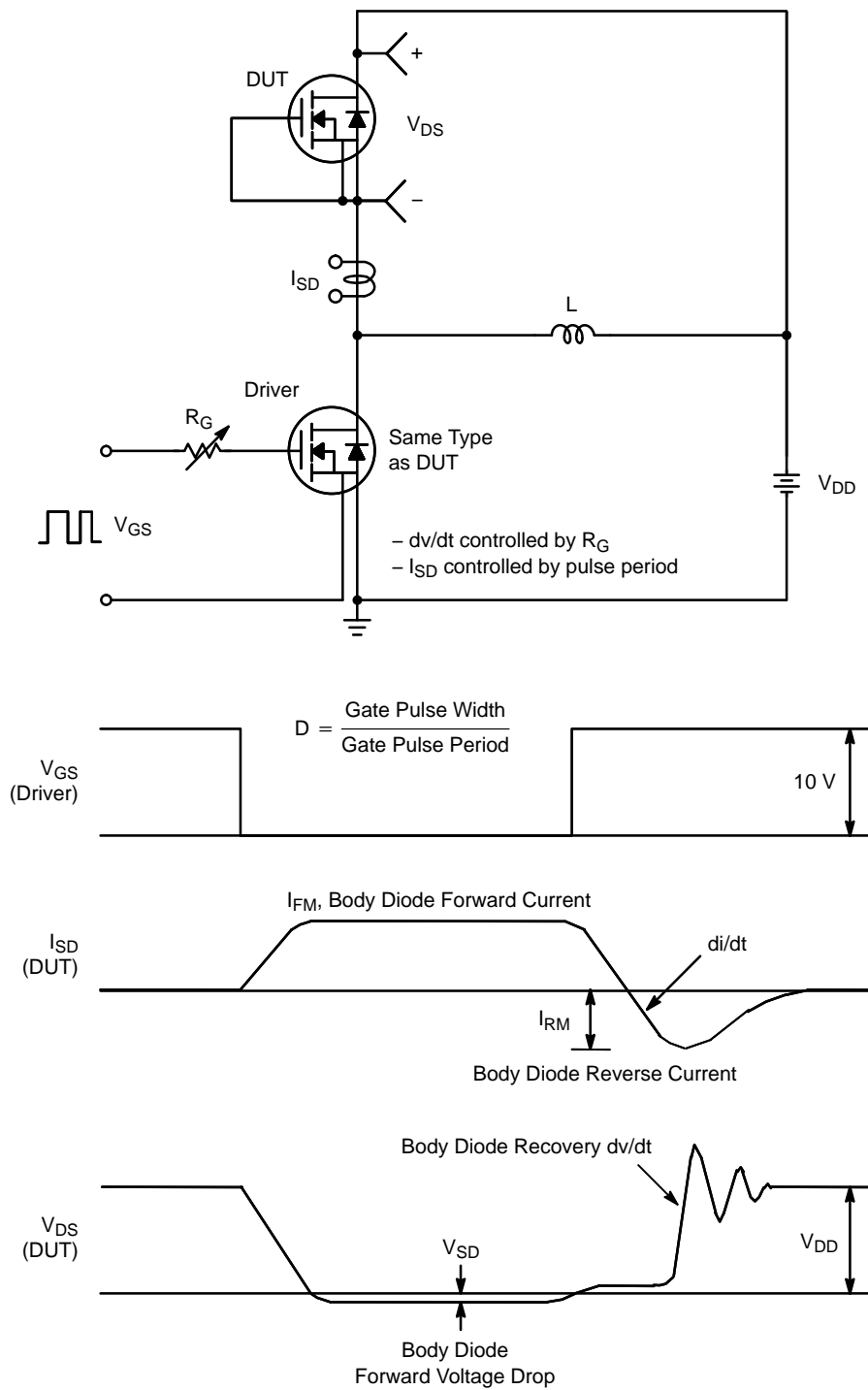


Figure 15. Unclamped Inductive Switching Test Circuit & Waveforms

# NTMT064N65S3H



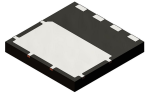
**Figure 16. Peak Diode Recovery  $dv/dt$  Test Circuit & Waveforms**

# NTMT064N65S3H

## REVISION HISTORY

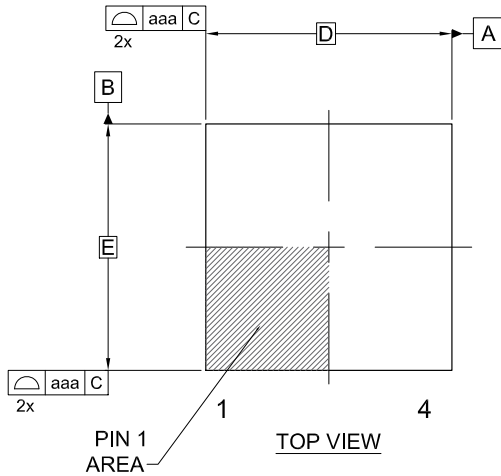
Revision	Description of Changes	Date
2	Rebranded the document to <b>onsemi</b> format.	1/16/2026

This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

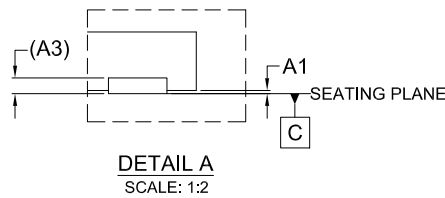


TDFN4 8.00x8.00x1.00, 2.00P  
CASE 520AB  
ISSUE A

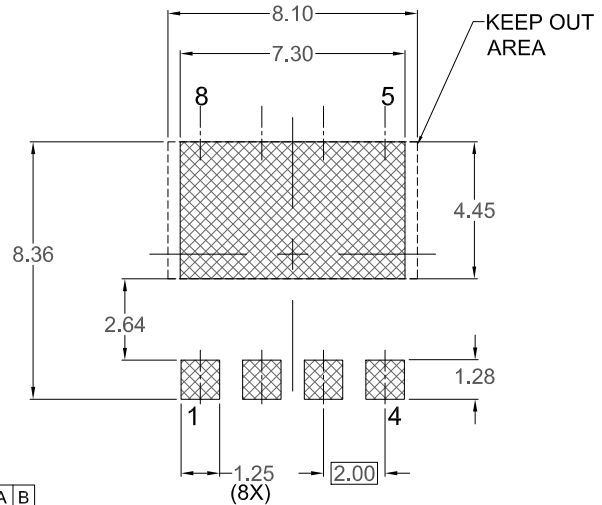
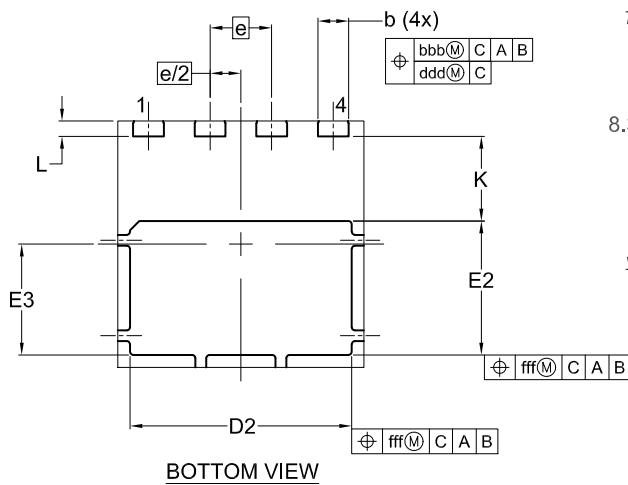
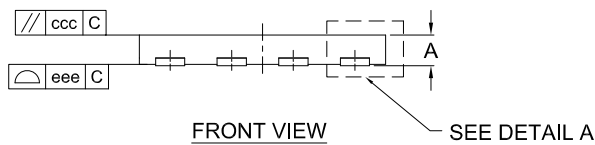
DATE 07 JUN 2024



- NOTES:  
 A) DIMENSIONS AND TOLERANCING CONFIRM TO ASME Y14.5-2018.  
 B) ALL DIMENSIONS ARE IN MILLIMETERS.  
 C) DIMENSIONS DO NOT INCLUDE BURRS OR MOLD FLASH. MOLD FLASH OR BURRS DOES NOT EXCEED 0.10MM.  
 D) IT IS RECOMMENDED TO HAVE NO TRACES OR VIAS WITHIN THE KEEP OUT AREA.



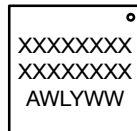
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	---	0.05
A3	0.20 REF		
b	0.90	1.00	1.10
D	8.00 BSC		
D2	7.10	7.20	7.30
E	8.00 BSC		
E2	4.25	4.35	4.45
E3	3.50	3.60	3.70
e	2.00 BSC		
e/2	1.00 BSC		
K	2.65	--	--
L	0.40	0.50	0.60
aaa	0.10		
bbb	0.10		
ccc	0.05		
ddd	0.05		
eee	0.10		
fff	0.10		



RECOMMENDED LAND PATTERN

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

GENERIC MARKING DIAGRAM\*



- XXXX = Specific Device Code
- A = Assembly Location
- L = Wafer Lot
- Y = Year
- W = 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. Some products may not follow the Generic Marking.

DOCUMENT NUMBER:	98AON73688G	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TDFN4 8.00x8.00x1.00, 2.00P	PAGE 1 OF 1

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)