MOSFET - Single, N-Channel, Logic Level, SO-8 FL

30 V, 1.15 mΩ, 230 A

NTMFS4C302N

V$_{(BR)DSS}$	R$_{DS(on)}$ MAX	I$_D$ MAX
30 V	1.15 mΩ @ 10 V	230 A
	1.7 mΩ @ 4.5 V	

Features

- Small Footprint (5x6 mm) for Compact Design
- Low R$_{DS(on)}$ to Minimize Conduction Losses
- Low Q$_G$ and Capacitance to Minimize Driver Losses
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

D (5,6)

G (4)

S (1,2,3)

N−CHANNEL MOSFET

MARKING DIAGRAM

SO−8 FLAT LEAD CASE 488AA STYLE 1

S   S   S   G
4C02N
AYWZZ
D   D   D   D

4C02N = Specific Device Code
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceabililty

MAXIMUM RATINGS (T$_J$ = 25°C unless otherwise noted)

| Parameter		Symbol	Value	Unit
Drain−to−Source Voltage		V$_{DSS}$	30	V
Gate−to−Source Voltage		V$_{GS}$	±20	V
Continuous Drain Current R$_{θJC}$ (Notes 1, 2, 3)	Steady State, T$_C$ = 25°C	I$_D$	230	A
Power Dissipation R$_{θJC}$ (Notes 1, 2)	T$_C$ = 25°C	P$_D$	96	W
Continuous Drain Current R$_{θJA}$ (Notes 1, 2, 3)	Steady State, T$_A$ = 25°C	I$_D$	41	A
Power Dissipation R$_{θJA}$ (Notes 1, 2)	T$_A$ = 25°C	P$_D$	3.13	W
Pulsed Drain Current	T$_A$ = 25°C, t$_p$ = 10 μs	I$_{DM}$	900	A
Operating Junction and Storage Temperature Range		T$_J$, T$_{stg}$	−55 to +150	°C
Source Current (Body Diode) @ 10 ms		I$_S$	128	A
Single Pulse Drain−to−Source Avalanche Energy (I$_{L(pk)}$ = 61 A)		E$_{AS}$	186	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 (Note 1)

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State (Note 2)	R$_{θJC}$	1.3	°C/W
Junction−to−Ambient − Steady State (Note 2)	R$_{θJA}$	40	

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 mm^2, 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.
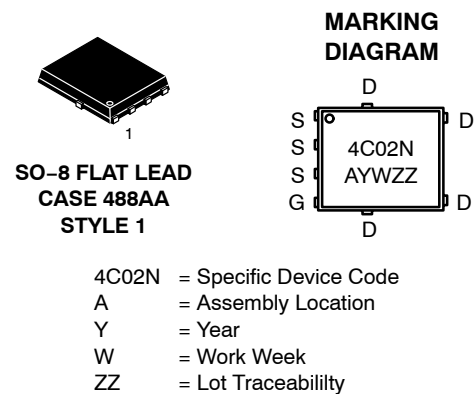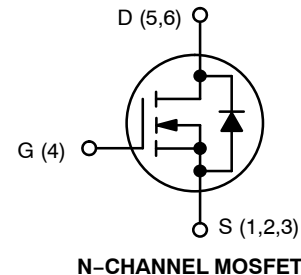
ORDERING INFORMATION

Device	Package	Shipping†
NTMFS4C302NT1G	SO−8 FL (Pb−Free)	1500 / Tape & Reel
NTMFS4C302NT3G	SO−8 FL (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.

May, 2023 − Rev. 4

Publication Order Number:
NTMFS4C302N/D

NTMFS4C302N

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	$V_{(BR)DSS}/T_J$				24		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			100	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 4)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.3		2.2	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				5.8		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 30 A		0.95	1.15	mΩ
		V_{GS} = 4.5 V	I_D = 30 A		1.35	1.7	
Forward Transconductance	g_{FS}	V_{DS} = 3 V, I_D = 30 A			135		S
Gate Resistance	R_G	T_A = 25 °C			0.75		Ω
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 15 V			5780		pF
Output Capacitance	C_{OSS}				2320		
Reverse Transfer Capacitance	C_{RSS}				70		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V; I_D = 30 A			37		nC
Threshold Gate Charge	$Q_{G(TH)}$				9.0		
Gate−to−Source Charge	Q_{GS}				16		
Gate−to−Drain Charge	Q_{GD}				7.0		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 15 V, I_D = 30 A			82		nC
SWITCHING CHARACTERISTICS (Note 5)							
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			20		ns
Rise Time	t_r				19		
Turn−Off Delay Time	$t_{d(OFF)}$				42		
Fall Time	t_f				11		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 A	T_J = 25°C		0.75	1.1	V
			T_J = 125°C		0.6		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 30 A			56		ns
Charge Time	t_a				29		
Discharge Time	t_b				27		
Reverse Recovery Charge	Q_{RR}				69		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. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
5. Switching characteristics are independent of operating junction temperatures.
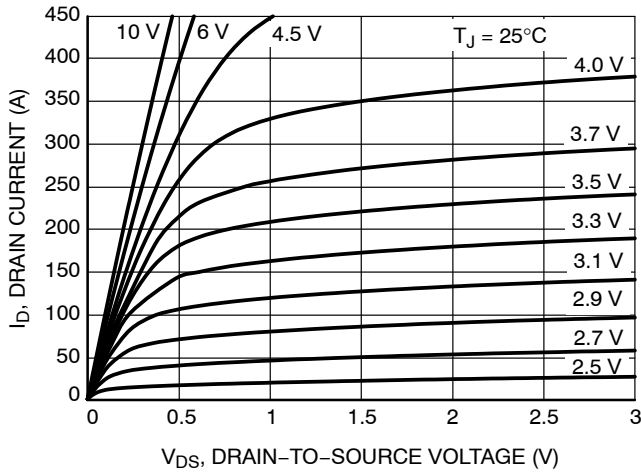
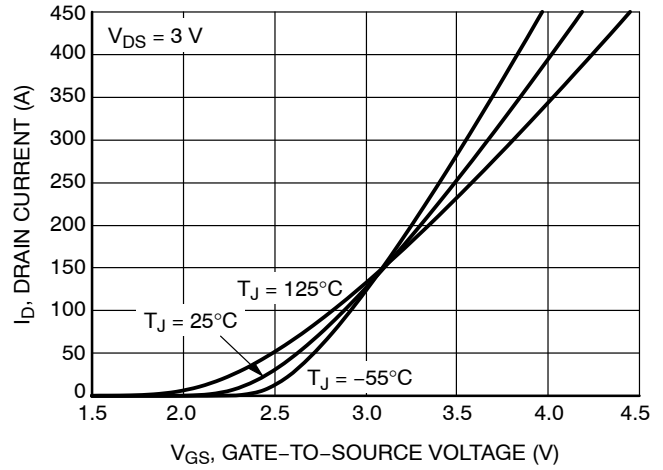## TYPICAL CHARACTERISTICS

Figure 1. On−Region Characteristics

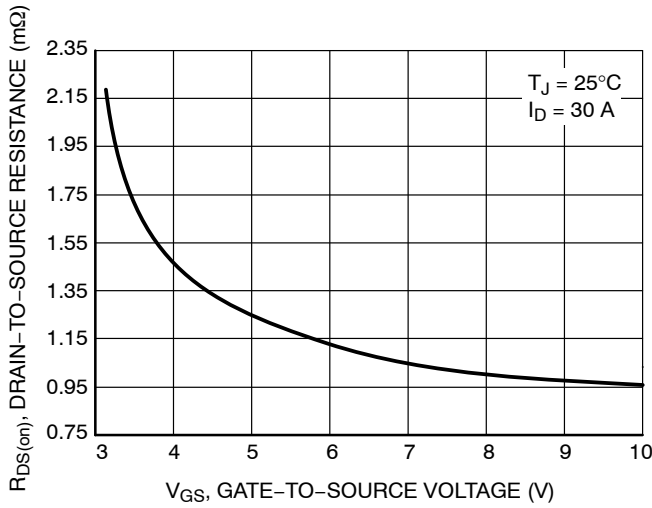
Figure 2. Transfer Characteristics
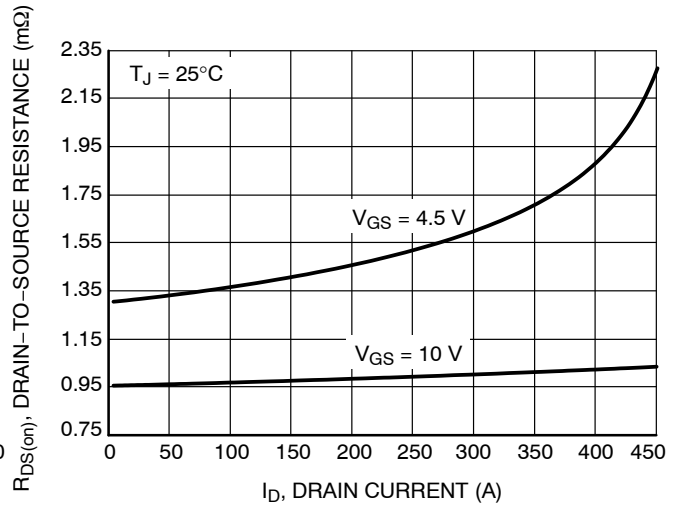

Figure 3. On−Resistance vs. V_{GS}

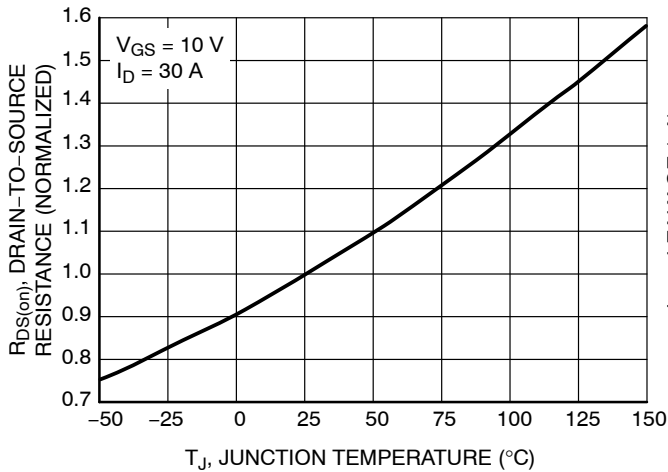Figure 4. On−Resistance vs. Drain Current and Gate Voltage
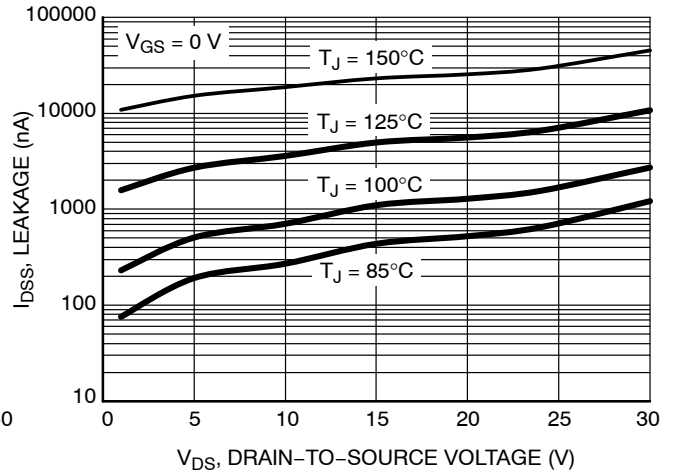

Figure 5. On−Resistance Variation with Temperature

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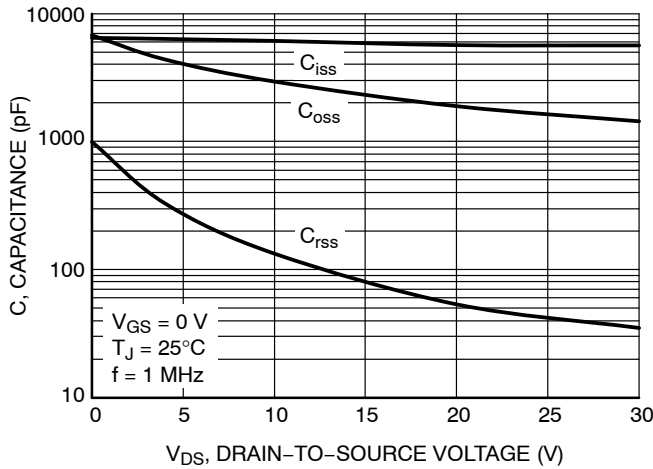
TYPICAL CHARACTERISTICS
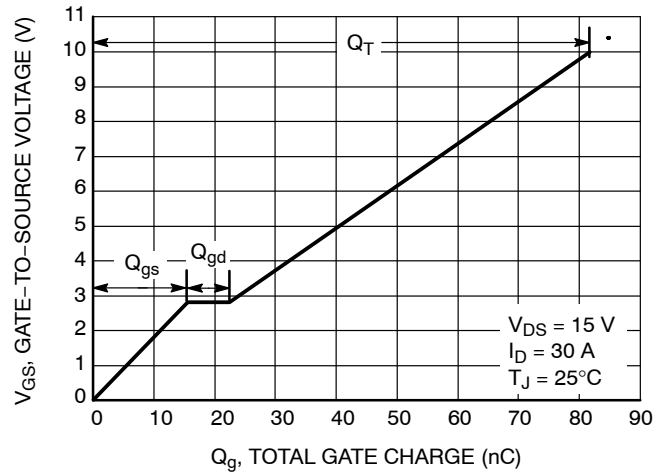

Figure 7. Capacitance Variation

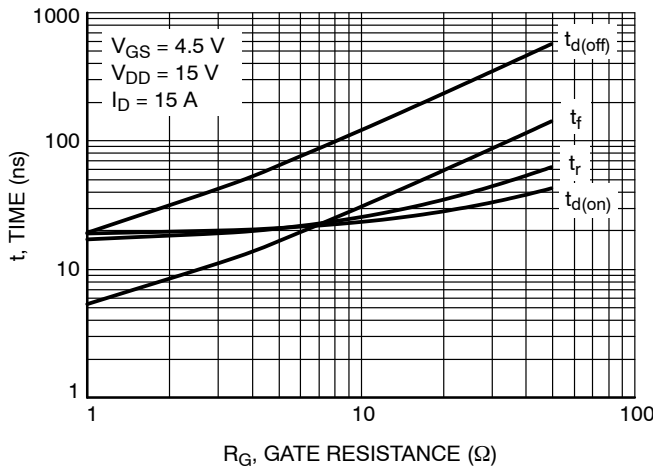**Figure 8. Gate–to–Source and Drain–to–Source Voltage vs. Total Charge**

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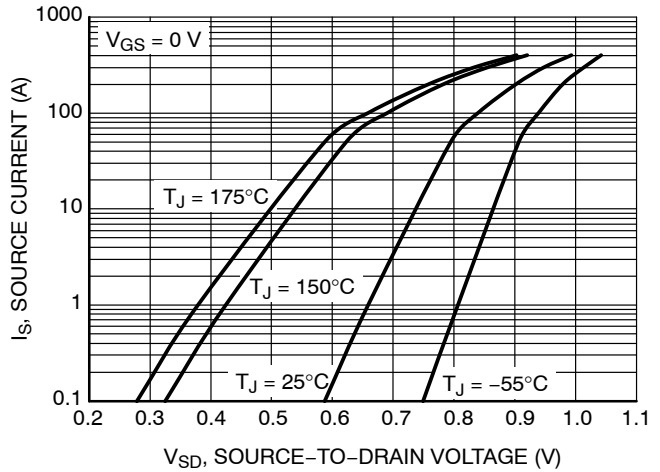
Figure 10. Diode Forward Voltage vs. Current
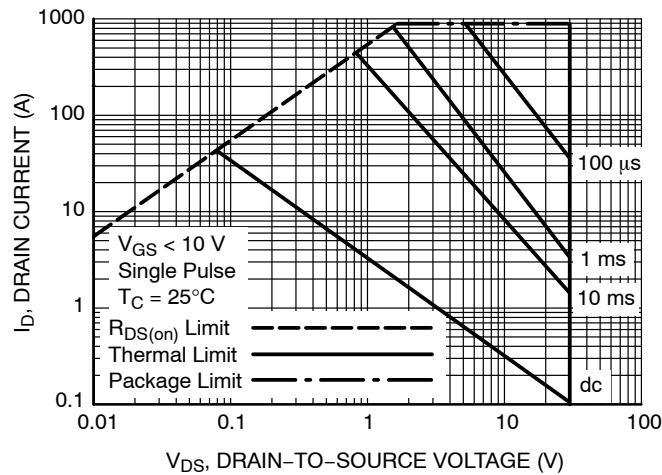
Figure 11. Maximum Rated Forward Biased Safe Operating Area

TYPICAL CHARACTERISTICS
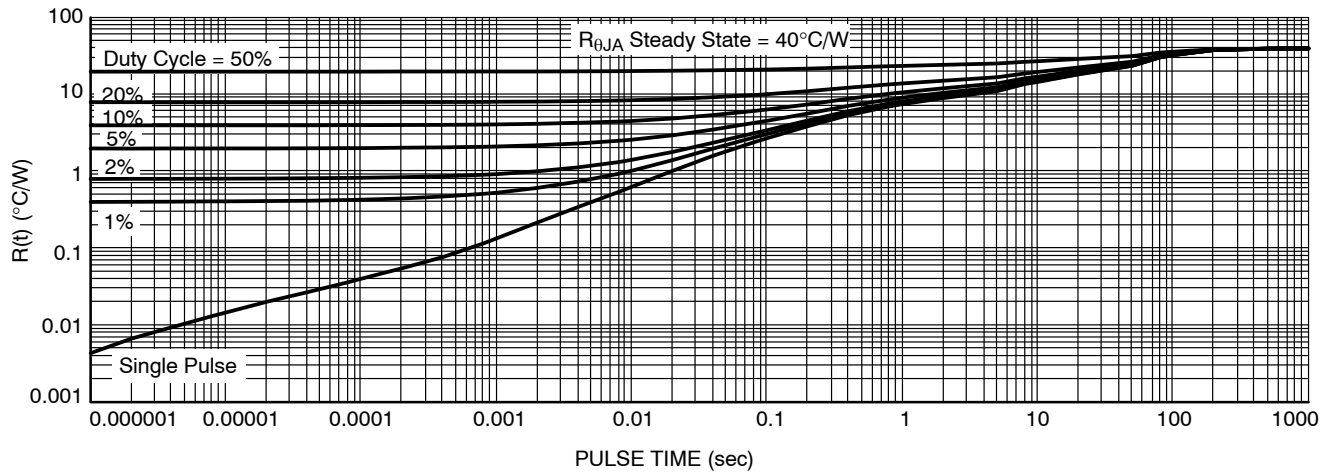
Figure 12. Thermal Response
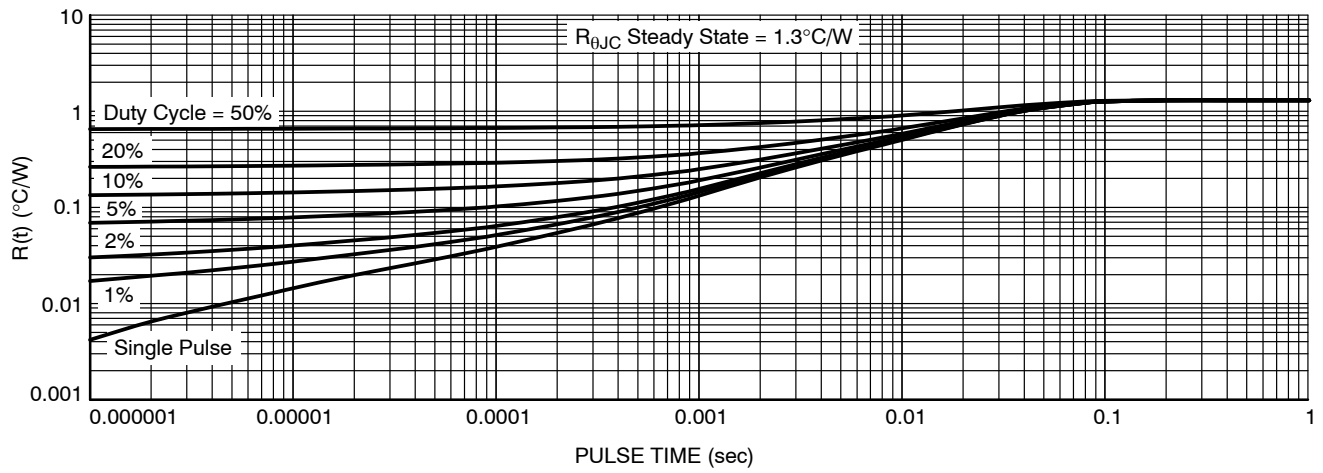
Figure 13. Thermal Response
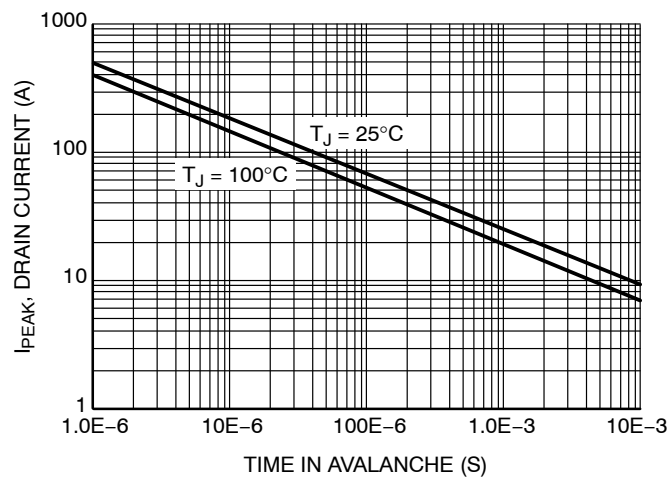
Figure 14. Maximum Drain Current vs. Time in Avalanche
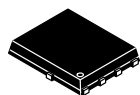
DFN5 5x6, 1.27P
(SO−8FL)
CASE 488AA
ISSUE N

SCALE 2:1

DATE 25 JUN 2018

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

2 X ⌒ 0.20 C

A

B **2 X** ⌒ 0.20 C

D
D1

E1 **E**

TOP VIEW

DETAIL A

4 X θ

c

A1

C

SEATING PLANE

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.00	---	0.05
b	0.33	0.41	0.51
c	0.23	0.28	0.33
D	5.00	5.15	5.30
D1	4.70	4.90	5.10
D2	3.80	4.00	4.20
E	6.00	6.15	6.30
E1	5.70	5.90	6.10
E2	3.45	3.65	3.85
e	1.27 BSC		
G	0.51	0.575	0.71
K	1.20	1.35	1.50
L	0.51	0.575	0.71
L1	0.125 REF		
M	3.00	3.40	3.80
θ	0 °	---	12 °

∥ 0.10 C

⌒ 0.10 C

A

SIDE VIEW

DETAIL A

GENERIC MARKING DIAGRAM*

1

XXXXXX
AYWZZ

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

8X b
⊕ 0.10 C A B
0.05 c

e/2
e

L
1 4

K

E2
PIN 5 (EXPOSED PAD)

L1 **M**

G **D2**

BOTTOM VIEW

RECOMMENDED SOLDERING FOOTPRINT*

2X 0.495
2X 1.530
4.560

2X 0.475
3.200
4.530

1.330

2X 0.905

1
0.965

4X 1.000
4X 0.750

1.270 PITCH

DIMENSIONS: MILLIMETER

*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.

STYLE 1:
PIN 1. SOURCE
2. SOURCE
3. SOURCE
4. GATE
5. DRAIN

STYLE 2:
PIN 1. ANODE
2. ANODE
3. ANODE
4. NO CONNECT
5. CATHODE

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

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DESCRIPTION:	**DFN5 5x6, 1.27P (SO−8FL)**		PAGE 1 OF 1

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