EFC4K110NUZ

MOSFET – Power, Dual, N-Channel, for 1-2 Cells Lithium-ion Battery Protection 24 V, 2.95 mΩ, 25 A

ON Semiconductor®

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Introduction

This Power MOSFET features a low on-state resistance. This device is suitable for applications such as power switches of portable machines. Best suited for 1-2 cells lithium-ion battery applications.

Features

- 2.5 V Drive
- 2 kV ESD HBM
- Common-Drain Type
- ESD Diode-Protected Gate
- This Device is Pb-Free, Halogen Free/BFR Free and is RoHS Compliant

Applications

- 1-2 Cells Lithium-ion Battery Charging and Discharging Switch

Specifications

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C) (Note 1)

Parameter	Symbol	Value	Unit
Source to Source Voltage	V_{SSS}	24	V
Gate to Source Voltage	V_{GSS}	±12	V
Source Current (DC)	I_S	25	A
Source Current (Pulse) PW ≤ 10 μs, duty cycle ≤ 1%	I_{SP}	100	A
Total Dissipation (Note 1)	P_T	2.5	W
Junction Temperature	T_j	150	°C
Storage Temperature	T_{stg}	−55 to +150	°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.

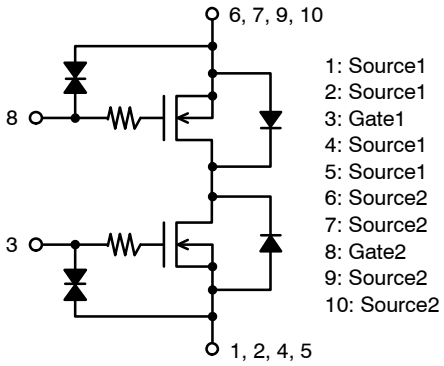
THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction to Ambient (Note 1)	$R_{\theta JA}$	50	°C/W

1. Surface mounted on ceramic substrate (5000 $mm^2 \times 0.8$ mm).

V_{SSS}	$R_{SS(ON)}$ MAX	I_S MAX
24 V	2.95 mΩ @ 4.5 V	25 A
	3.0 mΩ @ 3.8 V	
	4.7 mΩ @ 3.1 V	
	7.4 mΩ @ 2.5 V	

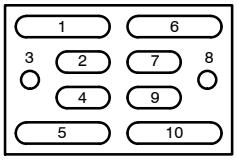
ELECTRICAL CONNECTION



N-Channel

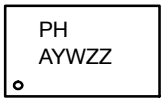
PIN ASSIGNMENT

WLCSP10
(3.20 x 2.10 x 0.14)
CASE 567XT



(Bottom View)

MARKING DIAGRAM



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

ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source to Source Breakdown Voltage	$V_{(BR)SSS}$	I_S = 1 mA, V_{GS} = 0 V	24			V
Zero-Gate Voltage Source Current	I_{SSS}	V_{SS} = 19.2 V, V_{GS} = 0 V			1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±8 V, V_{SS} = 0 V			±10	μA
Gate Threshold Voltage	V_{GS}(th)	V_{SS} = 10 V, I_S = 1 mA	0.4		1.3	V
Static Source to Source On-State Resistance	R_{SS}(on)	I_S = 5 A, V_{GS} = 4.5 V	1.6	2.4	2.95	mΩ
		I_S = 5 A, V_{GS} = 3.8 V	1.7	2.5	3.0	mΩ
		I_S = 5 A, V_{GS} = 3.1 V	2.0	2.9	4.7	mΩ
		I_S = 5 A, V_{GS} = 2.5 V	2.2	3.6	7.4	mΩ
Gate Resistance	Rg	f = 1 MHz		310		Ω
Total Gate Charge	Qg	V_{SS} = 11.5 V, V_{GS} = 4.5 V, I_S = 5 A		49		nC
Turn-ON Delay Time	t_d(on)	V_{SS} = 11.5 V, V_{GS} = 4.5 V, R_L = 2.3 Ω R_G = 0 Ω Switching Test Circuit		0.6		μs
Rise Time	t_r			1.6		μs
Turn-OFF Delay Time	t_d(off)			7.3		μs
Fall Time	t_f			3.2		μs
Forward Source to Source Voltage	$V_{F(S-S)}$	I_S = 3 A, V_{GS} = 0 V		0.75	1.2	V

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.

SWITCHING TEST CIRCUIT

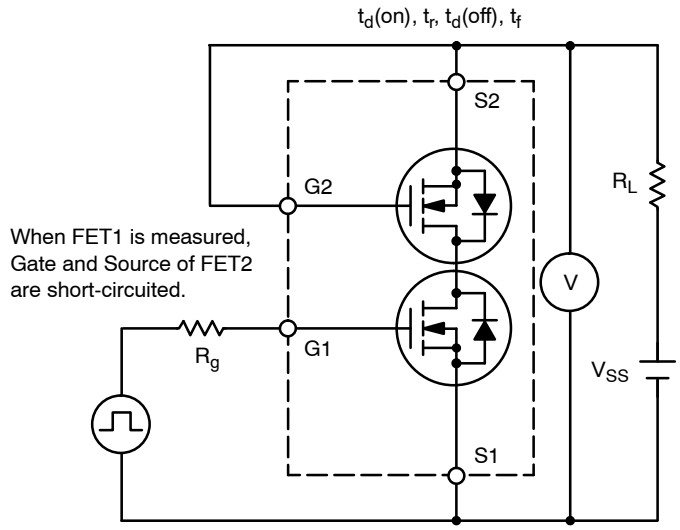


Figure 1. Switching Test Circuit

DEPENDENCY FIGURES

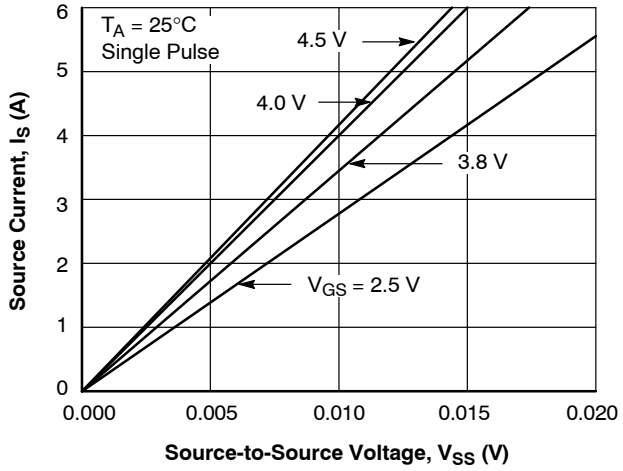


Figure 2. On-Region Characteristics

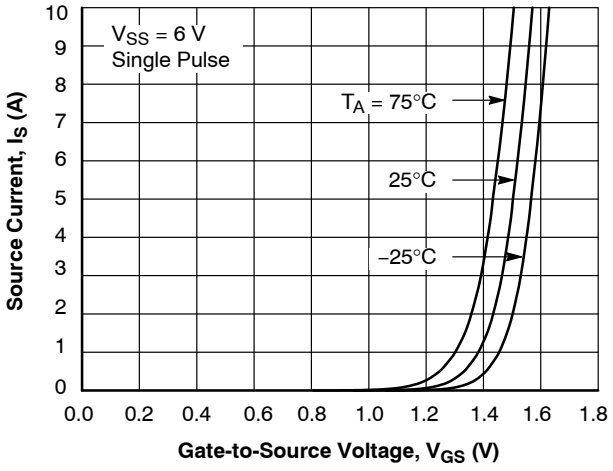


Figure 3. Transfer Characteristics

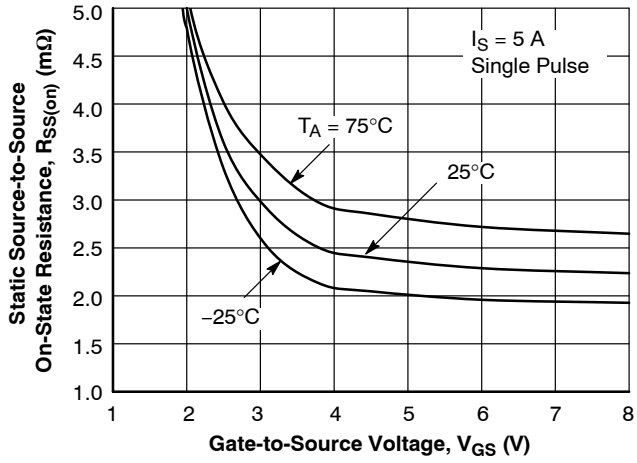


Figure 4. On-Resistance vs. Gate-to-Source Voltage

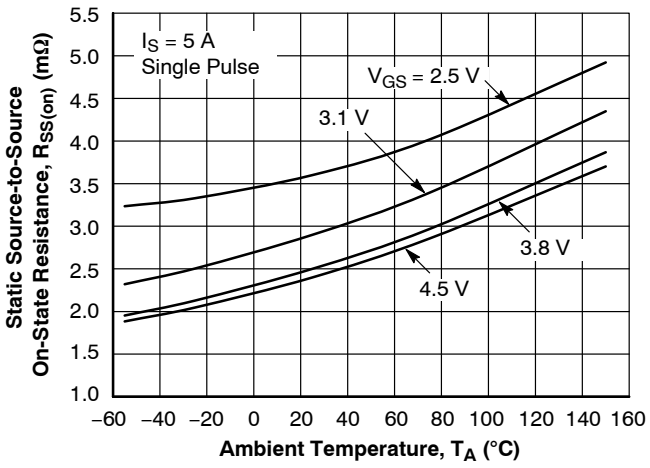


Figure 5. On-Resistance vs. Temperature

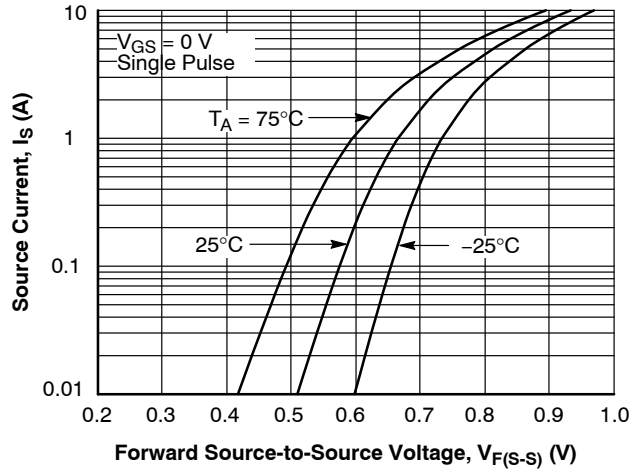


Figure 6. Forward Source-to-Source Voltage vs. Current

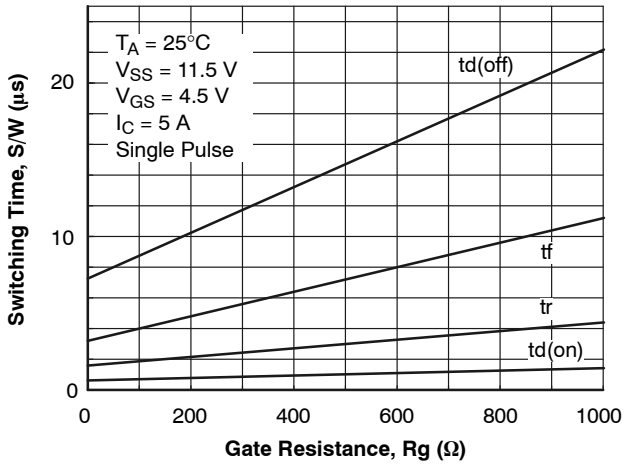


Figure 7. Switching Time vs. Gate Resistance (1)

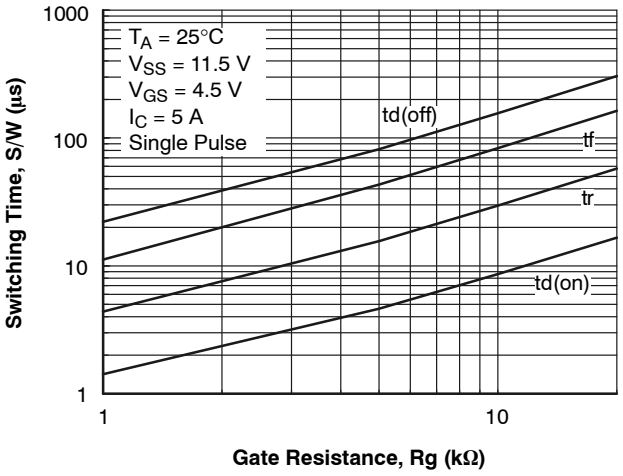


Figure 8. Switching Time vs. Gate Resistance (2)

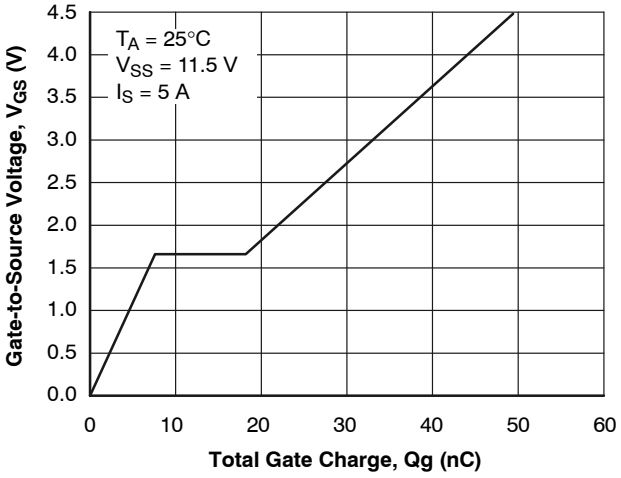


Figure 9. Gate-to-Source Voltage vs. Total Charge

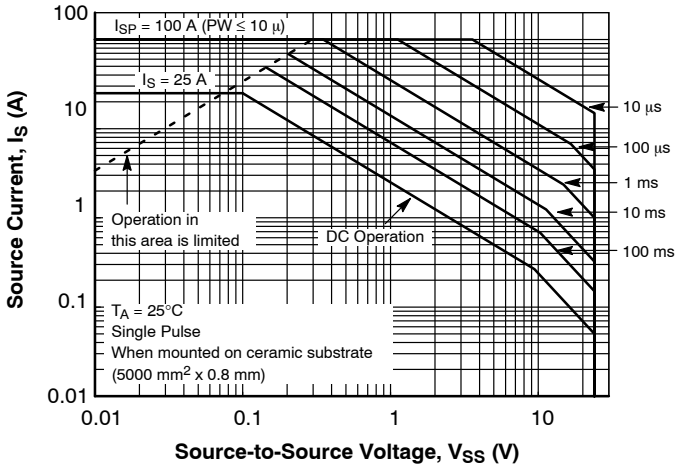


Figure 10. Safe Operating Area

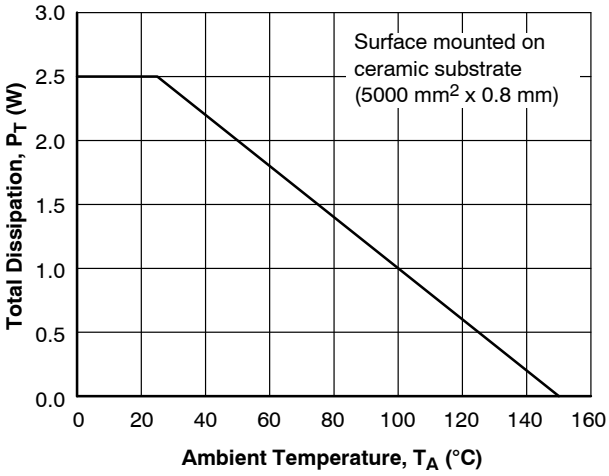


Figure 11. Total Dissipation vs. Temperature

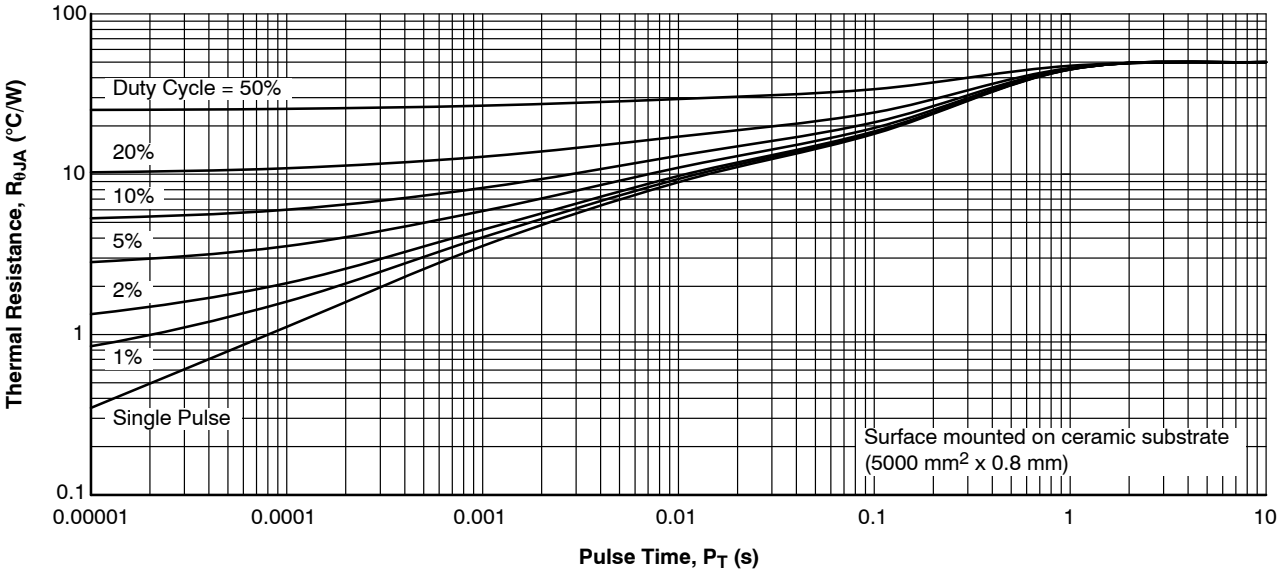


Figure 12. Thermal Response

ORDERING INFORMATION

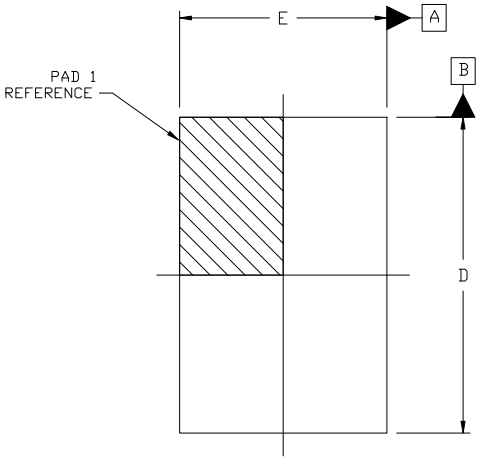
Device	Marking	Package	Shipping† (Qty / Packing)
EFC4K110NUZTDG	PH	WLCSP10, 3.20 x 2.10 x 0.14 (Pb-Free / Halogen Free)	5000 / Tape & Reel

†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.

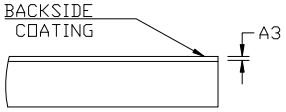
Note on usage: Since the EFC4K110NUZ is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

WLCSP10 3.2x2.1x0.14
CASE 567XT
ISSUE O

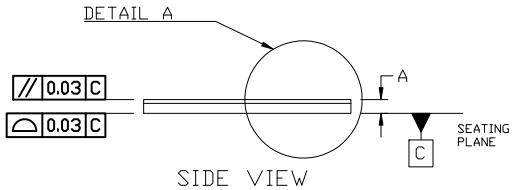
DATE 02 APR 2019



TOP VIEW



DETAIL A

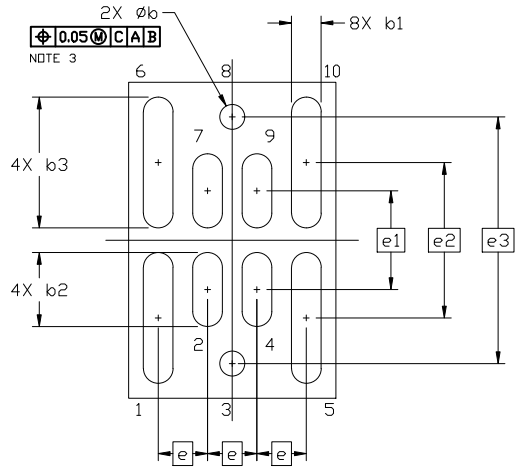


SIDE VIEW

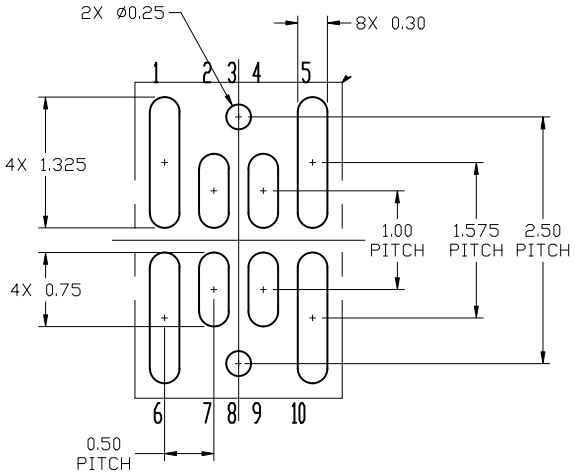
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. POSITIONAL TOLERANCE APPLIES TO ALL PADS.

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.11	0.14	0.17
A3		0.04 REF	
b	0.22	0.25	0.28
b1	0.27	0.30	0.33
b2	0.72	0.75	0.78
b3	1.295	1.325	1.355
D	3.17	3.20	3.23
E	2.07	2.10	2.13
e		0.50 BSC	
e1		1.0 BSC	
e2		1.575 BSC	
e3		2.50 BSC	



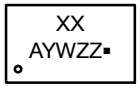
BOTTOM VIEW



RECOMMENDED
MOUNTING FOOTPRINT*

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

GENERIC MARKING DIAGRAM*



XX	=	Specific Device Code
A	=	Assembly Location
Y	=	Year
W	=	Work Week
ZZ	=	Assembly Lot Code
▪	=	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:	**98AON05933H**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**WLCSP10 3.2x2.1x0.14**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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For additional information, please contact your local Sales Representative

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