# **Power MOSFET** for 1-Cell Lithium-ion Battery Protection 12 V, 7.1 mΩ, 14 A, Dual N-Channel



# **ON Semiconductor®**

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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-cell lithium-ion battery applications.

#### Features

- 2.5 V Drive
- 2 kV ESD HBM
- Common-Drain Type
- ESD Diode-Protected Gate
- Pb-Free, Halogen Free and RoHS compliance

## **Applications**

• 1-Cell Lithium-ion Battery Charging and Discharging Switch

### **SPECIFICATIONS**

ABSOLUTE MAXIMUM RATINGS at Ta = 25°C (Notes 1, 2)

Parameter	Symbol	Value	Unit
Source to Source Voltage	VSSS	12	V
Gate to Source Voltage	VGSS	±8	V
Source Current (DC)	IS	14	А
Source Current (Pulse) PW $\leq 10\mu$ s, duty cycle $\leq 1\%$	ISP	60	А
Total Dissipation (Note 2)	Рт	1.5	W
Junction Temperature	Tj	150	°C
Storage Temperature	Tstg	-55 to +150	°C

Note 1 : 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.

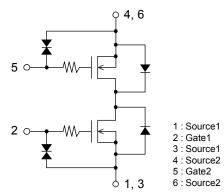
## THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit	
Junction to Ambient (Note 2)	$R_{\theta}JA$	83	°C/W	

Note 2 : Surface mounted on ceramic substrate (5000 mm<sup>2</sup> × 0.8 mm).

VSSS	R <sub>SS</sub> (on) Max	IS Max
12 V	7.1 mΩ @ 4.5 V	
	7.7 mΩ @ 3.8 V	14 A
	9.5 mΩ @ 3.1 V	14 A
	12.4mΩ @ 2.5 V	







WLCSP6, 2.11x1.18x0.10

GENERIC **MARKING DIAGRAM** 

NA ■ AYWZZ
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NA = Specific Device Code

- = Assembly Location А Y
  - = Year
- = Work Week W
- = Assembly Lot 77
- = Pb-Free Package

#### **ORDERING INFORMATION**

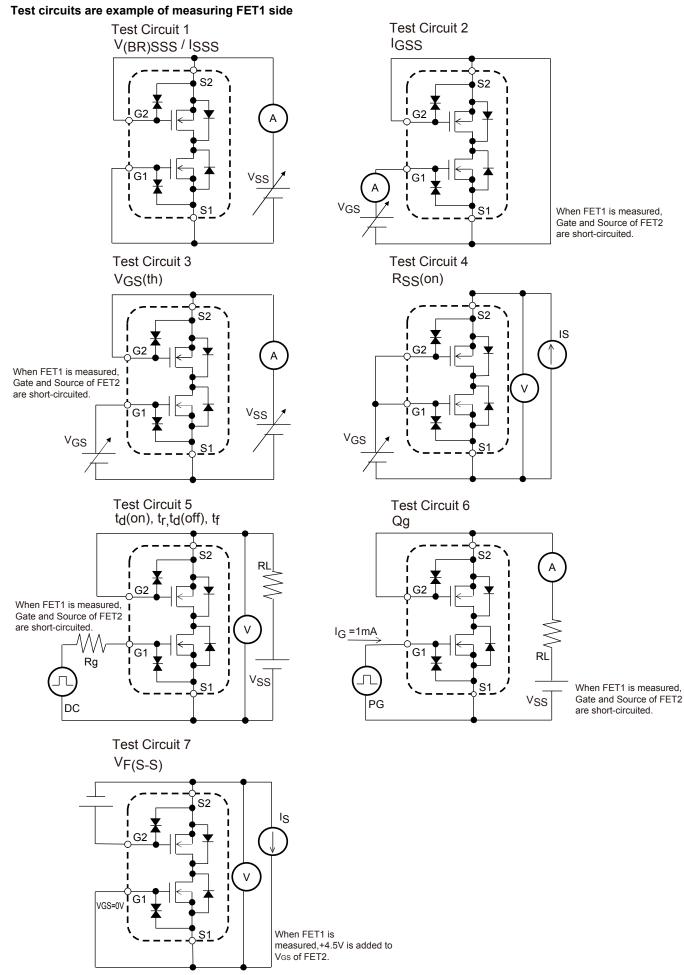
See detailed ordering and shipping information on page 6 of this data sheet.

# **ELECTRICAL CHARACTERISTICS** at Ta = 25°C (Notes 3, 4)

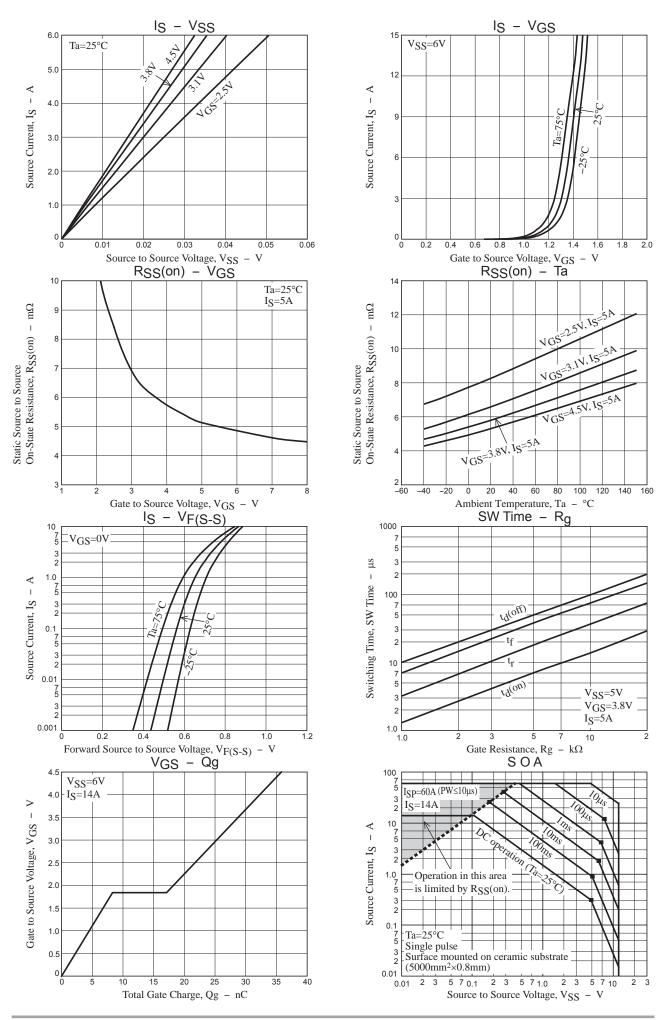
Deremeter	Cumphiel	Conditions		Value		1.1	
Parameter	Symbol			min	typ	max	Unit
Source to Source Breakdown Voltage	V(BR)SSS	I <sub>S</sub> = 1 mA, V <sub>GS</sub> = 0 V	Test Circuit 1	12			V
Zero-Gate Voltage Source Current	ISSS	V <sub>SS</sub> = 10 V, V <sub>GS</sub> = 0 V	Test Circuit 1			1	μA
Gate to Source Leakage Current	IGSS	$V_{GS}$ = ±8 V, $V_{SS}$ = 0 V	Test Circuit 2			±1	μA
Gate Threshold Voltage	VGS(th)	V <sub>SS</sub> = 6 V, I <sub>S</sub> = 1 mA	Test Circuit 3	0.4		1.3	V
Static Source to Source On-State Resistance (Note 4)	R <sub>SS</sub> (on)	IS = 5 A, VGS = 4.5 V	Test Circuit 4	3.7	5.4	7.1	mΩ
		IS = 5 A, VGS = 3.8 V	Test Circuit 4	4.1	5.9	7.7	mΩ
		IS = 5 A, VGS = 3.1 V	Test Circuit 4	4.6	6.7	9.5	mΩ
		IS = 5 A, VGS = 2.5 V	Test Circuit 4	5.8	8.4	12.4	mΩ
Turn-ON Delay Time	t <sub>d</sub> (on)	VSS = 5 V, VGS = 3.8 V, IS = 5 A			15		μS
Rise Time	tr				35		μS
Turn-OFF Delay Time	t <sub>d</sub> (off)	Rg = 10 kΩ	Test Circuit 5		100		μS
Fall Time	tf	1			75		μS
Total Gate Charge	Qg	V <sub>SS</sub> = 6 V, V <sub>GS</sub> = 4.5 V, I <sub>S</sub> = 14 A Test Circuit 6			36		nC
Forward Source to Source Voltage	VF(S-S)	IS = 3 A, VGS = 0 V	Test Circuit 7		0.76		V

Note 3 : 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.

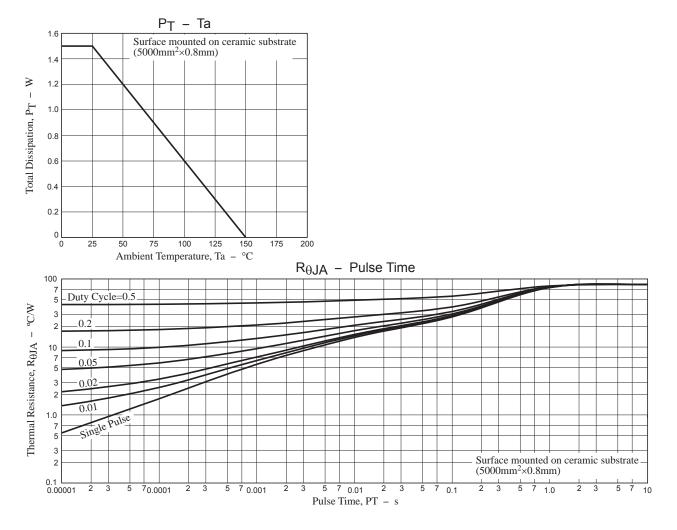
Note 4 : Mounted on ON Semiconductor board.



When FET2 is measured, the position of FET1 and FET2 is switched.

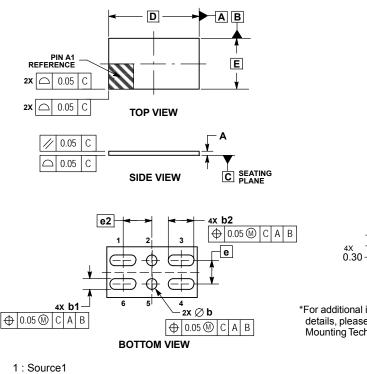


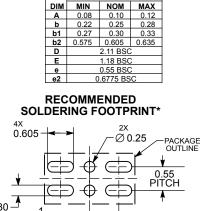
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#### PACKAGE DIMENSIONS unit : mm

#### WLCSP6, 2.11x1.18x0.10 CASE 567NP ISSUE B





DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994. CONTROLLING DIMENSION: MILLIMETERS.

MILLIMETERS

NOTES

1. 2

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

0.678 PITCH

- 2 : Gate1
- 3 : Source1
- 4 : Source2
- 5 : Gate2
- 6 : Source2

#### ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing)			
EFC2J004NUZTDG	NA	WLCSP6, 2.11x1.18x0.10 (Pb-Free / Halogen Free)	5,000 / 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. http://www.onsemi.com/pub\_link/Collateral/BRD8011-D.PDF

#### Note on usage : Since the EFC2J004NUZ is a MOSFET product, please avoid using this device in the vicinity of highly charged objects. Please contact sales for use except the designated application.

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