EFC4K105NUZ

Power MOSFET for 1-2 Cells Lithium-ion Battery Protection

22 V, 3.55 mΩ, 25 A, Dual N-Channel

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
- Common-Drain Type
- ESD Diode-Protected Gate
- This device is Pb-Free, Halogen Free and RoHS Compliance

Applications

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

Specifications

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Parameter	Symbol	Value	Unit
Source to Source Voltage	V_{SSS}	22	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).

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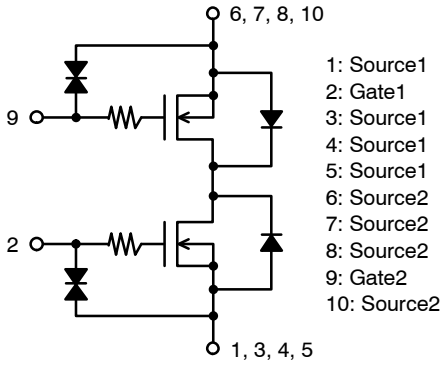
V_{SSS}	$R_{SS(ON)}$ MAX	I_S MAX
22 V	3.55 mΩ @ 4.5 V	25 A
	3.65 mΩ @ 3.8 V	
	5.3 mΩ @ 3.1 V	
	7.2 mΩ @ 2.5 V	

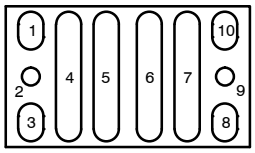
ELECTRICAL CONNECTION



N-Channel

PIN ASSIGNMENT

WLCSP10
(3.40 x 1.96 x 0.10)
CASE 567PL



MARKING DIAGRAM

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

ORDERING INFORMATION

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

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)SSS}$	Source to Source Breakdown Voltage	I_S = 1 mA, V_{GS} = 0 V	22			V
I_{SSS}	Zero-Gate Voltage Source Current	V_{SS} = 17.6 V, V_{GS} = 0 V			1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±8 V, V_{SS} = 0 V			±1	μA
V_{GS}(th)	Gate Threshold Voltage	V_{SS} = 10 V, I_S = 1 mA	0.4		1.3	V
R_{SS}(on)	Static Source to Source On-State Resistance	I_S = 5 A, V_{GS} = 4.5 V	1.8	2.7	3.55	mΩ
		I_S = 5 A, V_{GS} = 3.8 V	1.9	2.8	3.65	mΩ
		I_S = 5 A, V_{GS} = 3.1 V	2.0	3.3	5.3	mΩ
		I_S = 5 A, V_{GS} = 2.5 V	2.2	4.0	7.2	mΩ
t_d(on)	Turn-ON Delay Time	V_{SS} = 10 V, V_{GS} = 3.8 V, I_S = 5 A Rg = 10 kΩ Switching Test Circuit		13		μs
t_r	Rise Time			35		μs
t_d(off)	Turn-OFF Delay Time			185		μs
t_f	Fall Time			78		μs
Qg	Total Gate Charge	V_{SS} = 10 V, V_{GS} = 3.8 V, I_S = 5 A		43		nC
$V_{F(S-S)}$	Forward Source to Source Voltage	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.

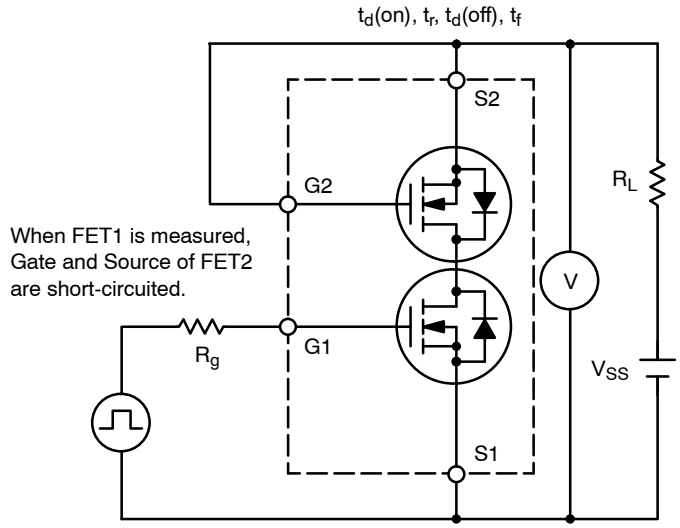


Figure 1. Switching Test Circuit

ORDERING INFORMATION

Device	Marking	Package	Shipping† (Qty / Packing)
EFC4K105NUZTDG	NZ	WLCSOP10, 3.40 x 1.96 x 0.10 (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.

TYPICAL CHARACTERISTICS

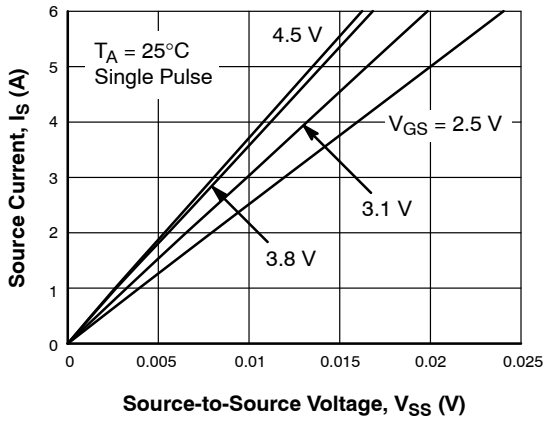


Figure 2. On-Region Characteristics

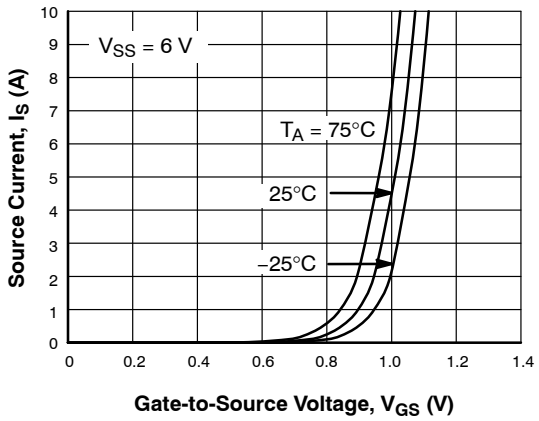


Figure 3. Transfer Characteristics

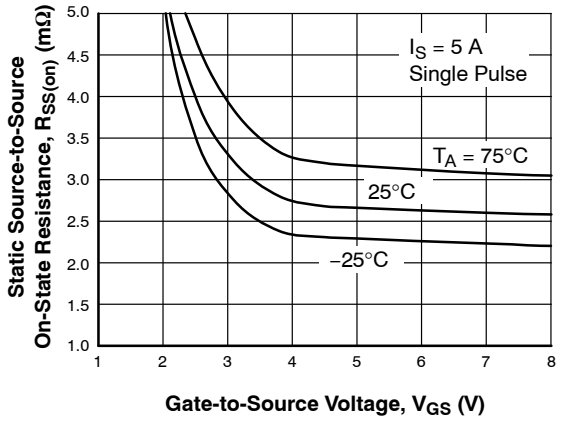


Figure 4. On-Resistance vs. Gate-to-Source Voltage

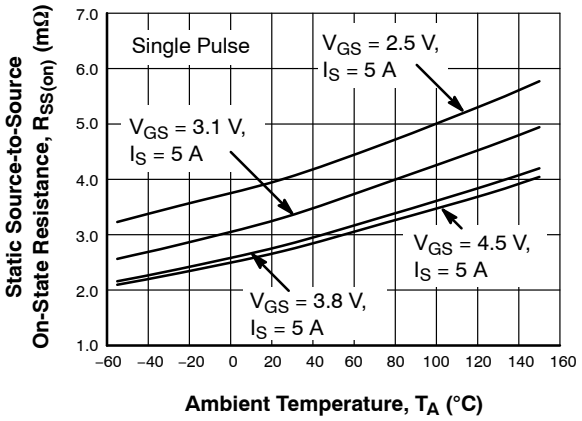


Figure 5. On-Resistance vs. Temperature

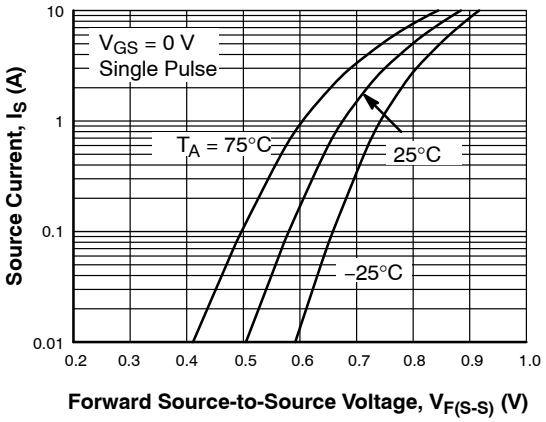


Figure 6. Forward Source-to-Source Voltage vs. Current

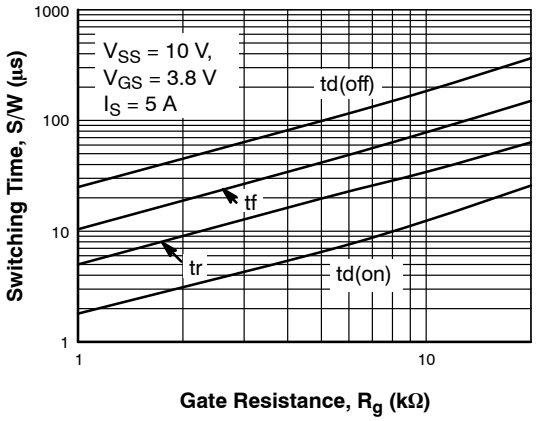


Figure 7. Switching Time vs. Gate Resistance

TYPICAL CHARACTERISTICS

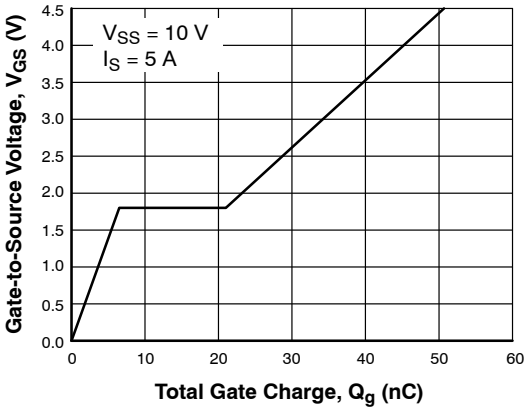


Figure 8. Gate-to-Source Voltage vs. Total Charge

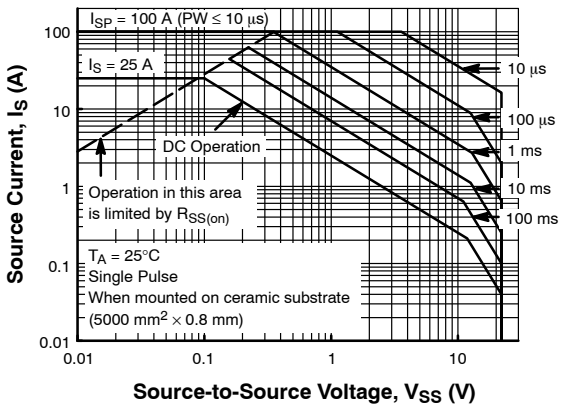


Figure 9. Safe Operating Area

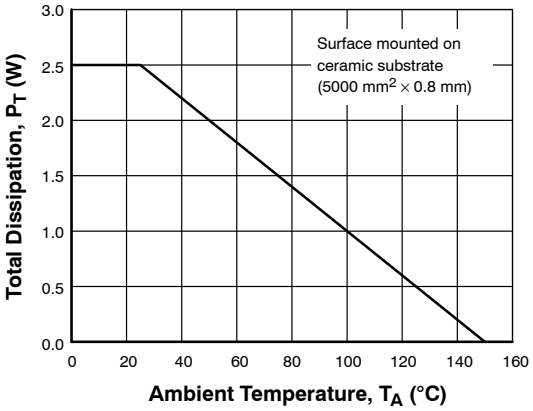


Figure 10. Total Dissipation vs. Temperature

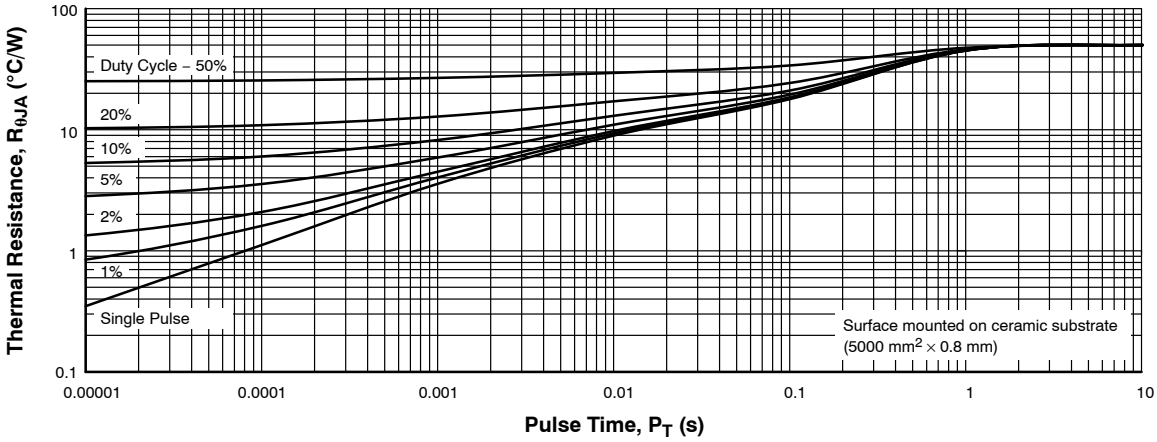
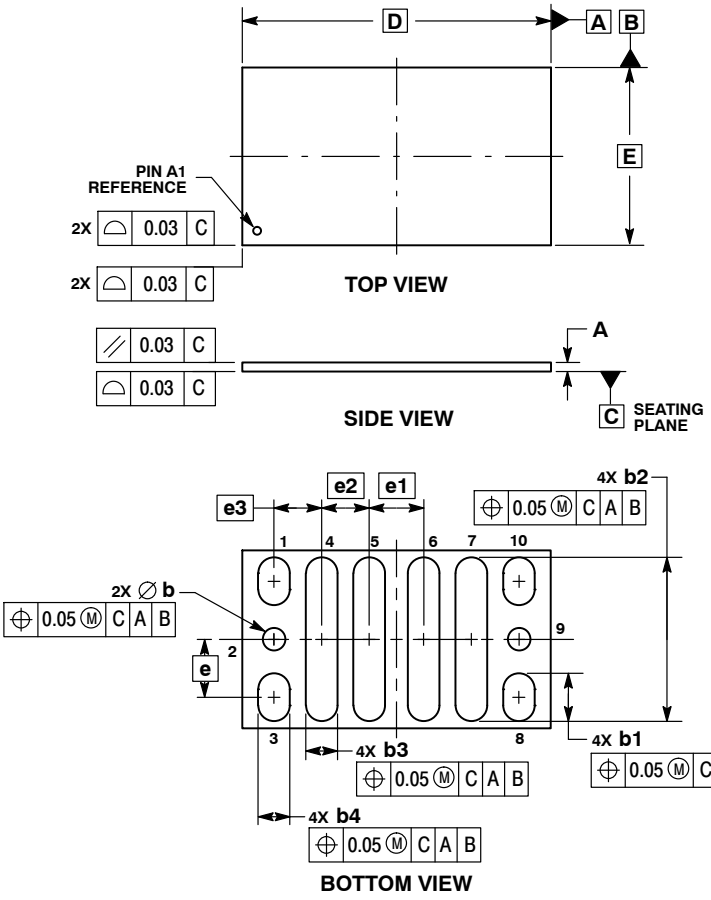


Figure 11. Thermal Response

PACKAGE DIMENSIONS

WLCSP10 3.40x1.96x0.10
CASE 567PL
ISSUE B

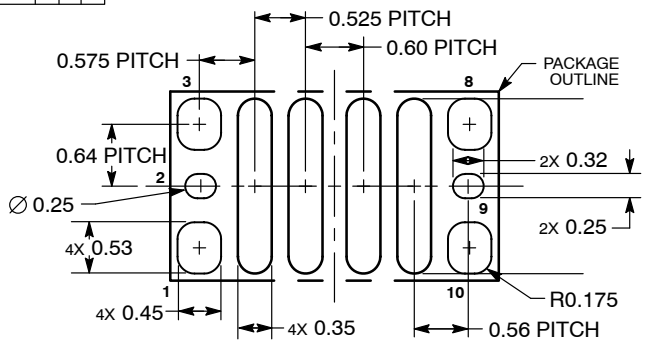


NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.

	MILLIMETERS		
DIM	MIN	NOM	MAX
A	0.08	0.10	0.12
b	0.22	0.25	0.28
b1	0.50	0.53	0.56
b2	1.78	1.81	1.84
b3	0.32	0.35	0.38
b4	0.32	0.35	0.38
D	3.40 BSC		
E	1.96 BSC		
e	0.64 BSC		
e1	0.60 BSC		
e2	0.525 BSC		
e3	0.525 BSC		

1: Source1
2: Gate1
3: Source1
4: Source1
5: Source1
6: Source2
7: Source2
8: Source2
9: Gate2
10: Source2

RECOMMENDED SOLDERING FOOTPRINT*



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.

Note on Usage: Since the EFC4K105NUZ is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative