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EFC3J018NUZ

Power MOSFET for 1-2 Cells Lithium-ion Battery Protection 20 V, 4.7 mΩ, 23 A, Dual N-Channel



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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 1-2 cells 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

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

SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS at $T_a = 25^\circ\text{C}$ (Note 1)

Parameter	Symbol	Value	Unit
Source to Source Voltage	V_{SSS}	20	V
Gate to Source Voltage	V_{GSS}	± 12	V
Maximum Operating Gate to Source Voltage (Note 2)	$V_{GSS(OP)}$	± 8	V
Source Current (DC)	I_S	23	A
Source Current (Pulse) $PW \leq 100 \mu\text{s}$, duty cycle $\leq 1\%$	I_{SP}	100	A
Total Dissipation (Note 3)	P_T	2.5	W
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

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.

Note 2 : Functional operation above the stresses listed in the recommended operating ranges is not implied. Extended exposure to stresses beyond the recommended operating ranges limits may affect device reliability

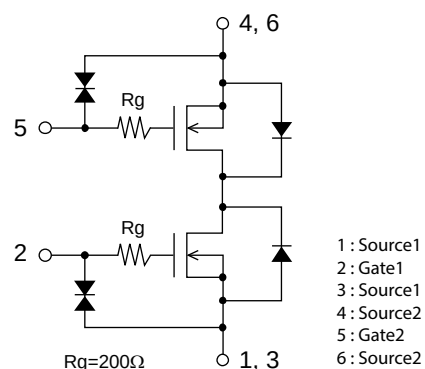
THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction to Ambient (Note 3)	$R_{\theta JA}$	50	$^\circ\text{C/W}$

Note 3 : Surface mounted on ceramic substrate ($5000 \text{ mm}^2 \times 0.8 \text{ mm}$).

V_{SSS}	$R_{SS(on)}$ Max	I_S Max
20 V	4.7 mΩ @ 4.5 V	23 A
	4.75 mΩ @ 4.0 V	
	4.9 mΩ @ 3.8 V	
	5.4 mΩ @ 3.1 V	
	9.0 mΩ @ 2.5 V	

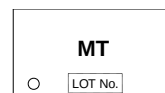
ELECTRICAL CONNECTION N-Channel



MARKING



WLCSP6, 1.77x3.05



MT = Device Code

ORDERING INFORMATION

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

EFC3J018NUZ

ELECTRICAL CHARACTERISTICS at Ta = 25°C (Notes 4, 5)

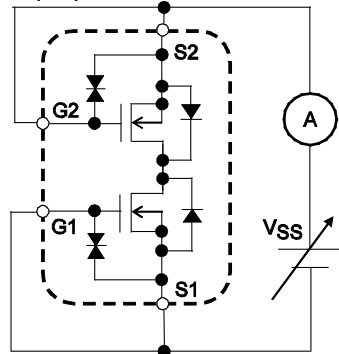
Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Source to Source Breakdown Voltage	V(BR)SSS	I _S = 1 mA, V _{GS} = 0 V Test Circuit 1	20			V
Zero-Gate Voltage Source Current	I _{SSS}	V _{SS} = 20 V, V _{GS} = 0 V Test Circuit 1			1	μA
Gate to Source Leakage Current	I _{GSS}	V _{GS} = ±8 V, V _{SS} = 0 V Test Circuit 2			±1	μA
Gate Threshold Voltage	V _{GS(th)}	V _{SS} = 10 V, I _S = 1 mA Test Circuit 3	0.5		1.3	V
Static Source to Source On-State Resistance	R _{SS(on)}	I _S = 5 A, V _{GS} = 4.5 V Test Circuit 4	2.5	3.6	4.7	mΩ
		I _S = 5 A, V _{GS} = 4.0 V Test Circuit 4	2.56	3.65	4.75	mΩ
		I _S = 5 A, V _{GS} = 3.8 V Test Circuit 4	2.6	3.75	4.9	mΩ
		I _S = 5 A, V _{GS} = 3.1 V Test Circuit 4	2.9	4.15	5.4	mΩ
		I _S = 5 A, V _{GS} = 2.5 V Test Circuit 4	3.3	4.75	9.0	mΩ
Turn-ON Delay Time	t _{d(on)}	V _{SS} = 10 V, V _{GS} = 4.5 V, I _S = 3 A Test Circuit 5		280		ns
Rise Time	t _r			890		ns
Turn-OFF Delay Time	t _{d(off)}			4,100		ns
Fall Time	t _f			2,800		ns
Total Gate Charge	Q _g	V _{SS} = 10 V, V _{GS} = 4.5 V, I _S = 23 A Test Circuit 6		75		nC
Forward Source to Source Voltage	V _{F(S-S)}	I _S = 3 A, V _{GS} = 0 V Test Circuit 7		0.74	1.2	V

Note 4 : 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.

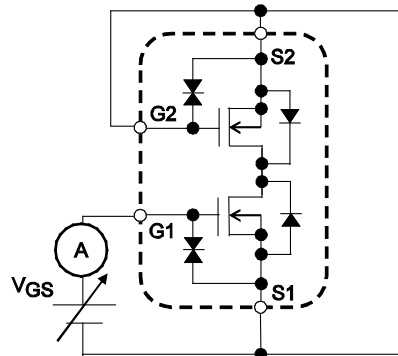
Note 5 : Refer to the JIS 7030 measuring methods for transistors for measuring.

Test circuits are example of measuring FET1 side

Test Circuit 1
 $V_{(BR)SSS} / I_{SSS}$

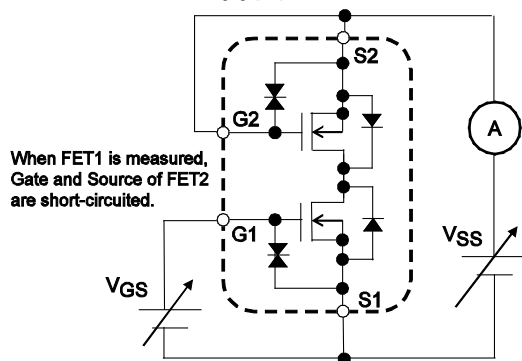


Test Circuit 2
 I_{GSS}



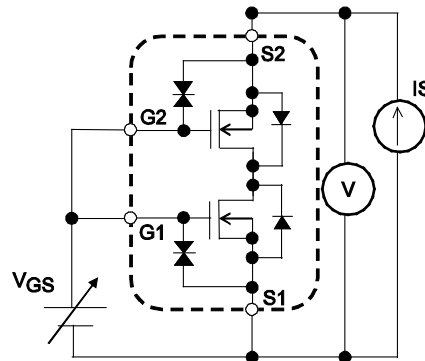
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 3
 $V_{GS(th)}$

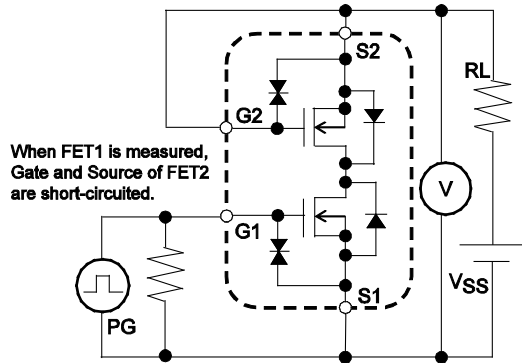


When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 4
 $R_{SS(on)}$

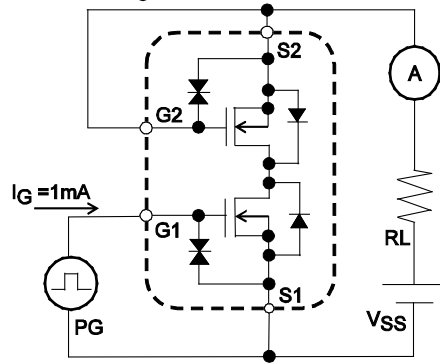


Test Circuit 5
 $t_d(on)$, t_r , $t_d(off)$, t_f



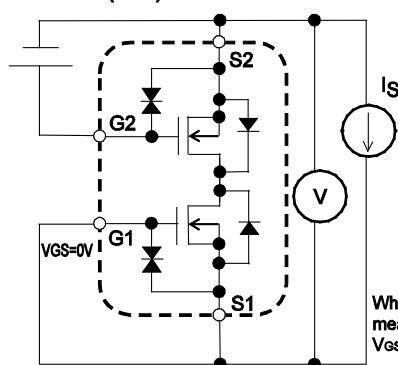
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 6
 Q_g



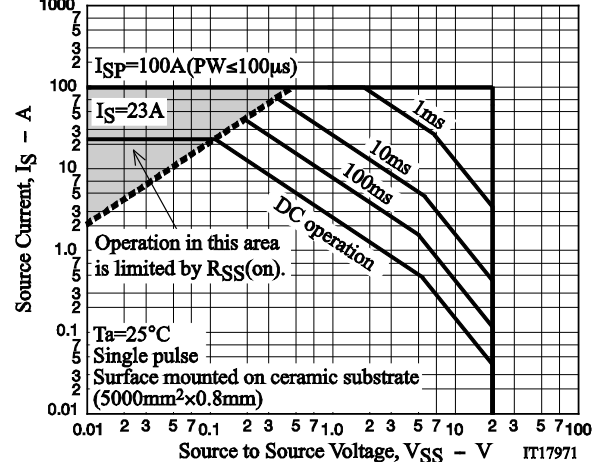
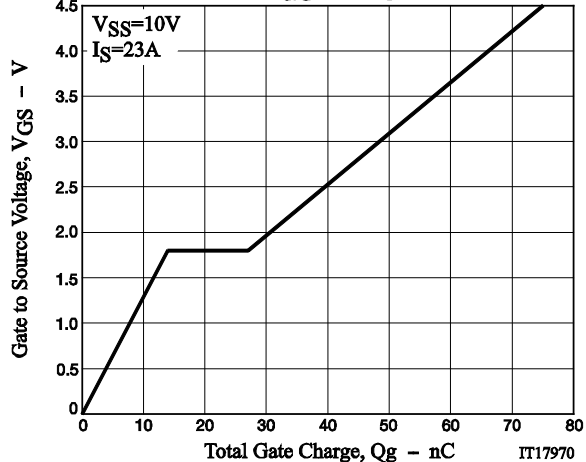
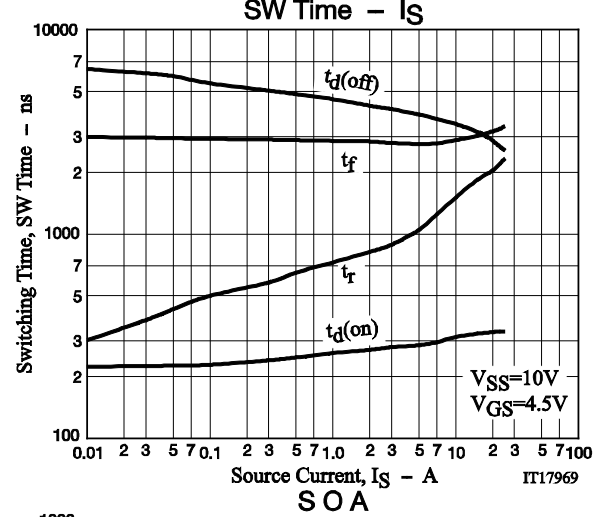
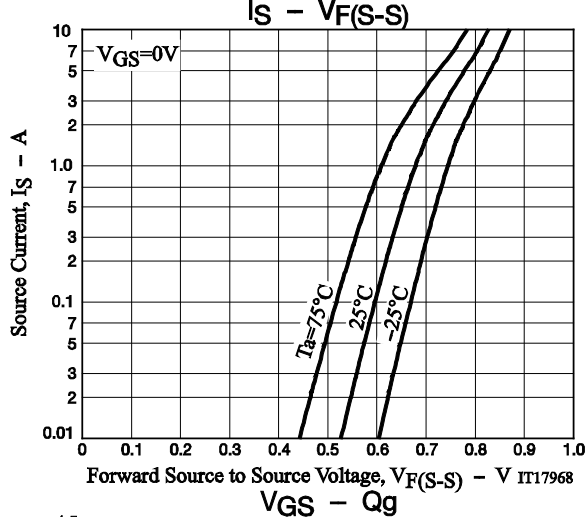
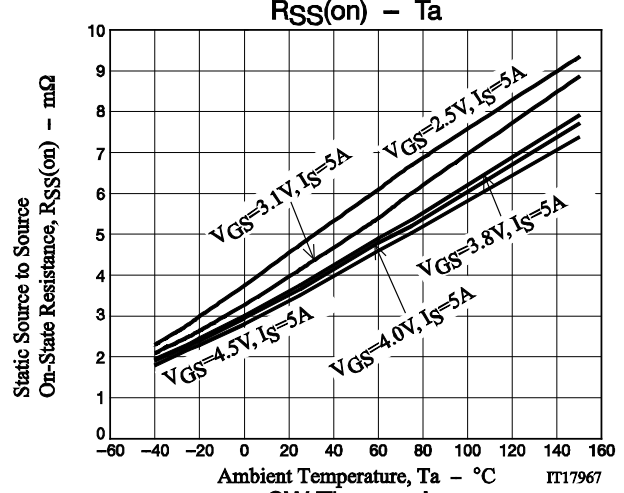
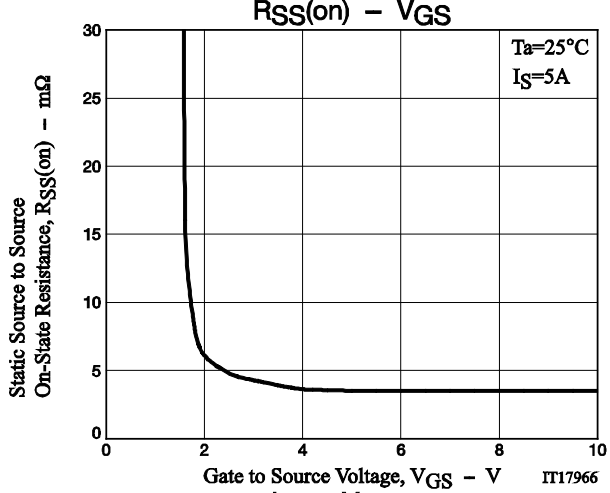
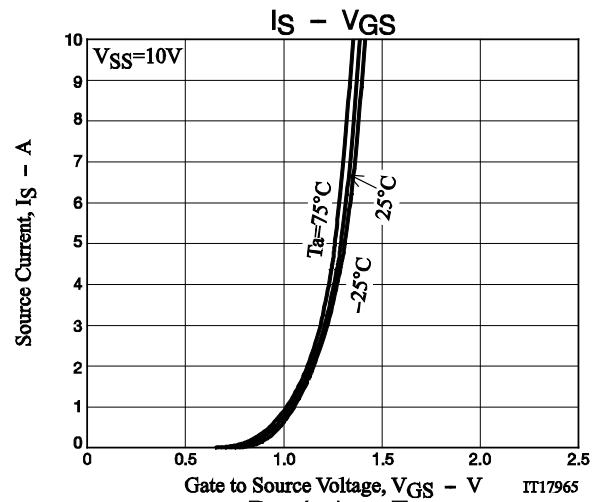
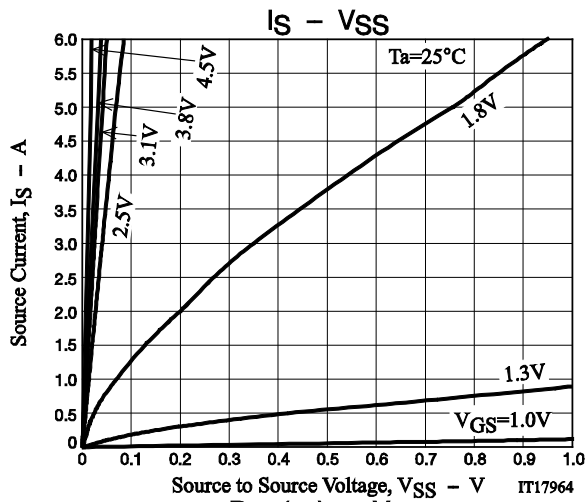
When FET1 is measured, Gate and Source of FET2 are short-circuited.

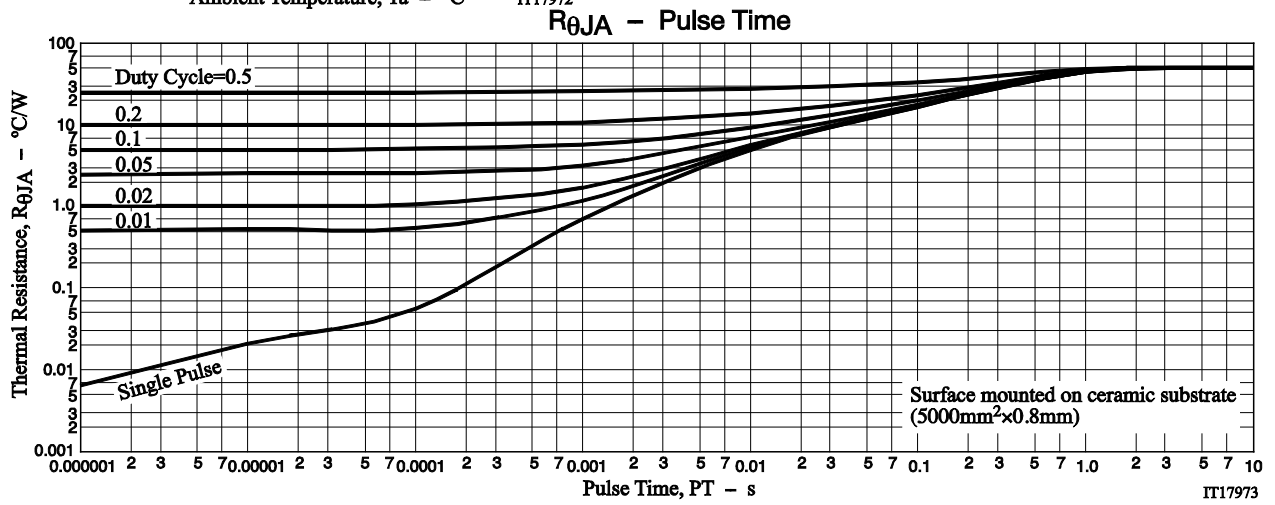
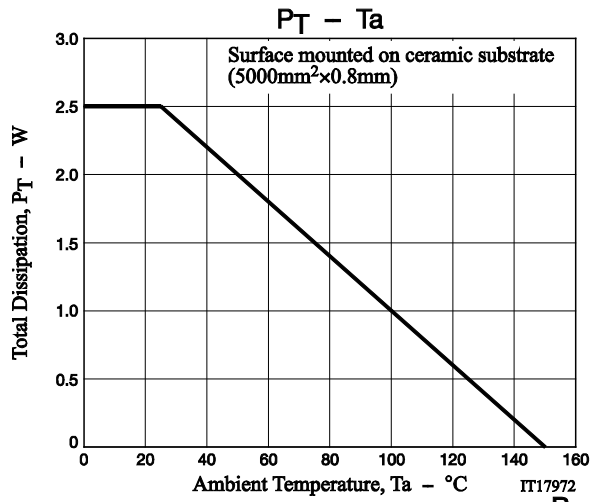
Test Circuit 7
 $V_F(S-S)$



When FET1 is measured, +4.5V is added to V_{GS} of FET2.

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





EFC3J018NUZ

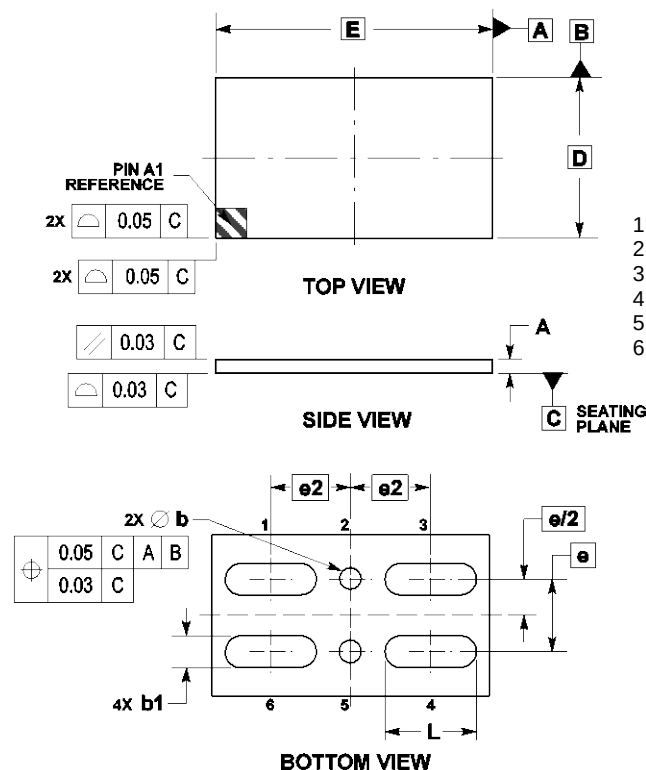
PACKAGE DIMENSIONS

unit : mm

WLCSP6, 1.77x3.05

CASE 567KS

ISSUE Q



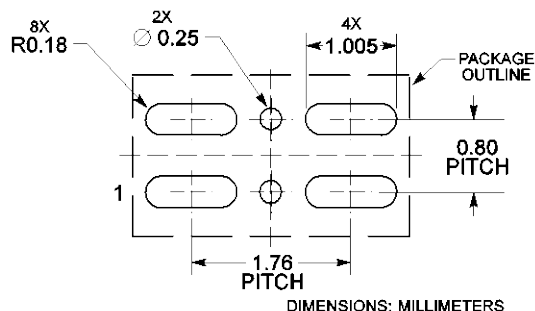
NOTES:

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

DIM	MILLIMETERS	
	MIN	MAX
A	---	0.145
b	0.22	0.28
b1	0.32	0.38
D	1.77 BSC	
E	3.05 BSC	
e	0.80 BSC	
e2	0.8775 BSC	
l	0.975	1.035

```
1 : Source1
2 : Gate1
3 : Source1
4 : Source2
5 : Gate2
6 : Source2
```

**RECOMMENDED
SOLDERING 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.**

ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing)
EFC3J018NUZTDG	MT	WLCSP6, 1.77 x 3.05 (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 EFC3J018NUZ 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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