



# EFC6604R

## N-Channel Power MOSFET 12V, 13A, 9.0mΩ, Dual EFCP

**ON Semiconductor®**
<http://onsemi.com>

### Features

- 2.5V drive
- Common-drain type
- 2KV ESD HBM
- Protection diode in
- Halogen free compliance

### Applications

- Lithium-ion battery charging and discharging switch

### Specifications

#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Source to Source Voltage	$V_{SSS}$		12	V
Gate to Source Voltage	$V_{GSS}$		$\pm 12$	V
Source Current (DC)	$I_S$		13	A
Source Current (Pulse)	$I_{SP}$	$PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$	60	A
Total Dissipation	$P_T$	When mounted on ceramic substrate (5000mm <sup>2</sup> × 0.8mm)	1.6	W
Channel Temperature	$T_{ch}$		150	°C
Storage Temperature	$T_{stg}$		-55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

#### Electrical Characteristics at $T_a = 25^\circ\text{C}$

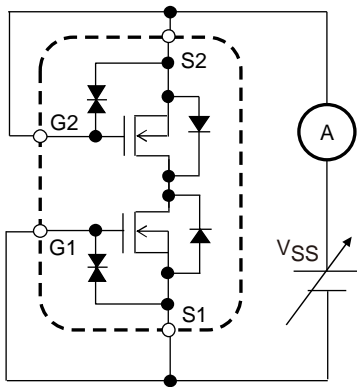
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Source to Source Breakdown Voltage	$V_{(BR)SSS}$	$I_S = 1\text{mA}$ , $V_{GS} = 0\text{V}$ Test Circuit 1	12			V
Zero-Gate Voltage Source Current	$I_{SSS}$	$V_{SS} = 10\text{V}$ , $V_{GS} = 0\text{V}$ Test Circuit 1			1	$\mu\text{A}$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 8\text{V}$ , $V_{SS} = 0\text{V}$ Test Circuit 2			$\pm 1.0$	$\mu\text{A}$
Cutoff Voltage	$V_{GS(off)}$	$V_{SS} = 6\text{V}$ , $I_S = 1\text{mA}$ Test Circuit 3	0.5		1.3	V
Forward Transfer Admittance	$ y_{fs} $	$V_{SS} = 6\text{V}$ , $I_S = 3\text{A}$ Test Circuit 4		13.7		S
Static Source to Source On-State Resistance	$R_{SS(on)1}$	$I_S = 3\text{A}$ , $V_{GS} = 4.5\text{V}$ Test Circuit 5	6.0	7.5	9.0	$\text{m}\Omega$
	$R_{SS(on)2}$	$I_S = 3\text{A}$ , $V_{GS} = 4.0\text{V}$ Test Circuit 5	6.4	8.1	9.7	$\text{m}\Omega$
	$R_{SS(on)3}$	$I_S = 3\text{A}$ , $V_{GS} = 3.8\text{V}$ Test Circuit 5	6.7	8.4	10.0	$\text{m}\Omega$
	$R_{SS(on)4}$	$I_S = 3\text{A}$ , $V_{GS} = 3.1\text{V}$ Test Circuit 5	7.8	9.8	12.7	$\text{m}\Omega$
	$R_{SS(on)5}$	$I_S = 3\text{A}$ , $V_{GS} = 2.5\text{V}$ Test Circuit 5	10.0	12.6	17.7	$\text{m}\Omega$
Turn-ON Delay Time	$t_d(on)$	$V_{SS} = 6\text{V}$ , $V_{GS} = 4.5\text{V}$ , $I_S = 3\text{A}$ Test Circuit 6		300		ns
Rise Time	$t_r$			1200		ns
Turn-OFF Delay Time	$t_d(off)$			5200		ns
Fall Time	$t_f$			3900		ns
Total Gate Charge	$Q_g$	$V_{SS} = 6\text{V}$ , $V_{GS} = 4.5\text{V}$ , $I_S = 13\text{A}$ Test Circuit 7		29		nC
Forward Source to Source Voltage	$V_{F(S-S)}$	$I_S = 3\text{A}$ , $V_{GS} = 0\text{V}$ Test Circuit 8		0.75	1.2	V

### ORDERING INFORMATION

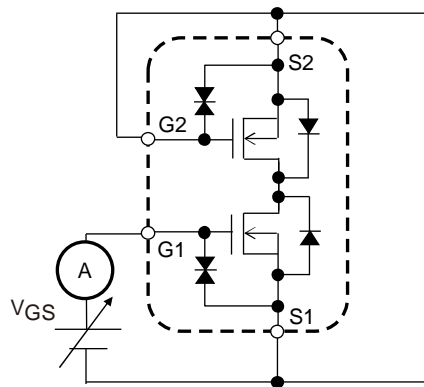
See detailed ordering and shipping information on page 5 of this data sheet.

Test circuits are example of measuring FET1 side

Test Circuit 1  
I<sub>SSS</sub>

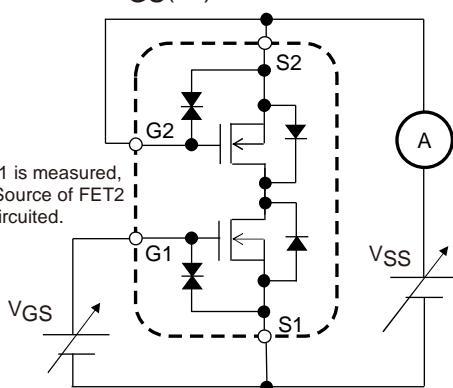


Test Circuit 2  
I<sub>GSS</sub>



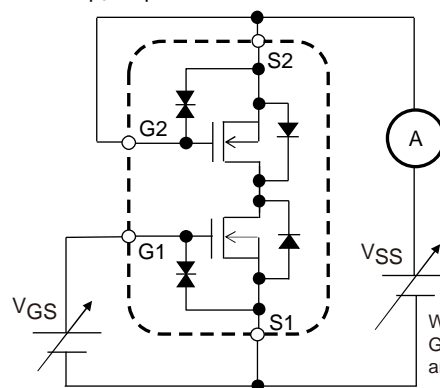
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 3  
V<sub>GS(off)</sub>



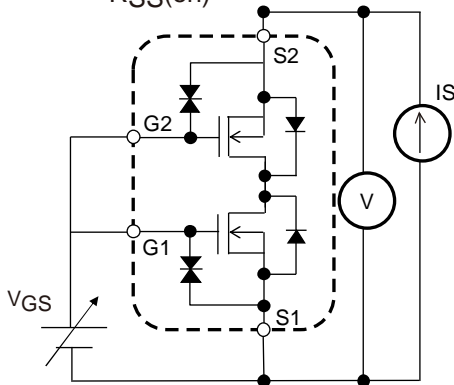
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 4  
|y<sub>fs</sub>|

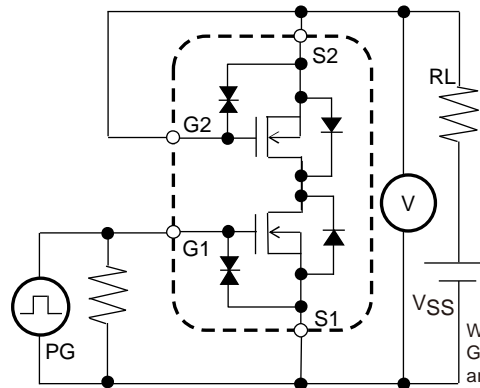


When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 5  
R<sub>SS(on)</sub>

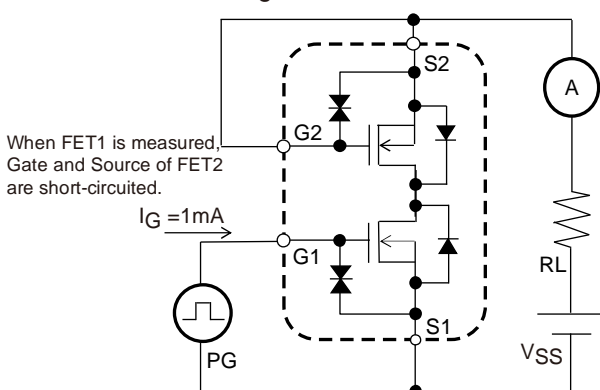


Test Circuit 6  
t<sub>d(on)</sub>, t<sub>r</sub>, t<sub>d(off)</sub>, t<sub>f</sub>



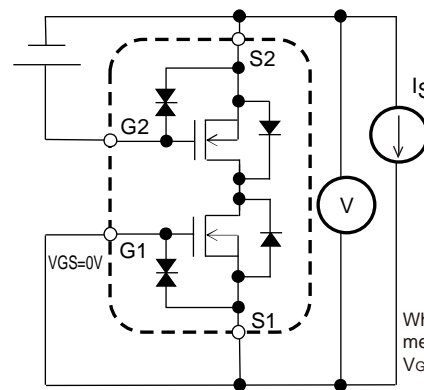
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 7  
Q<sub>g</sub>



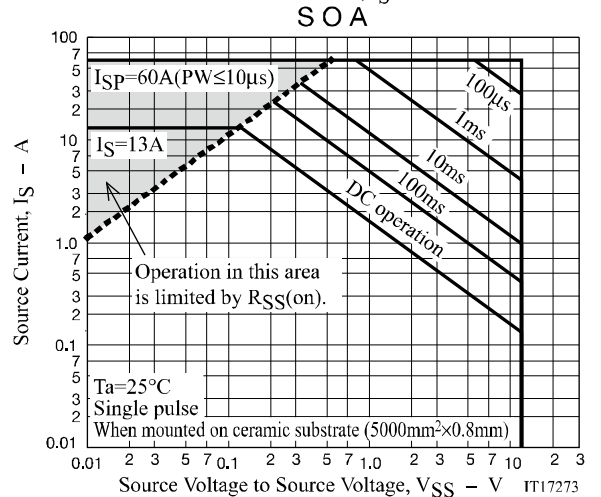
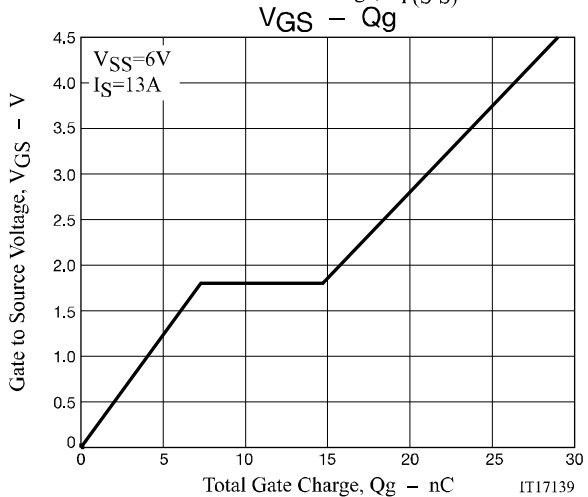
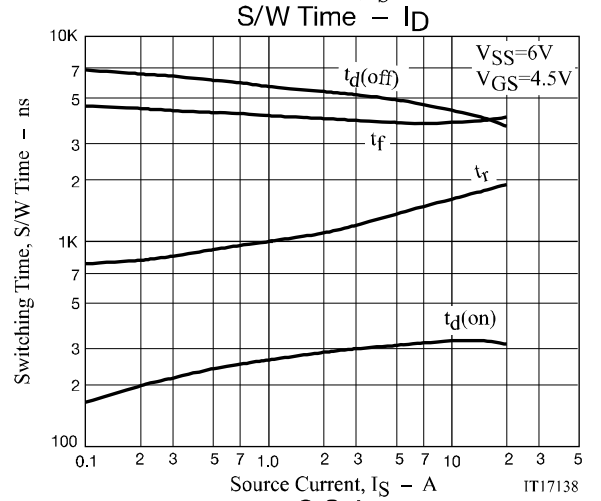
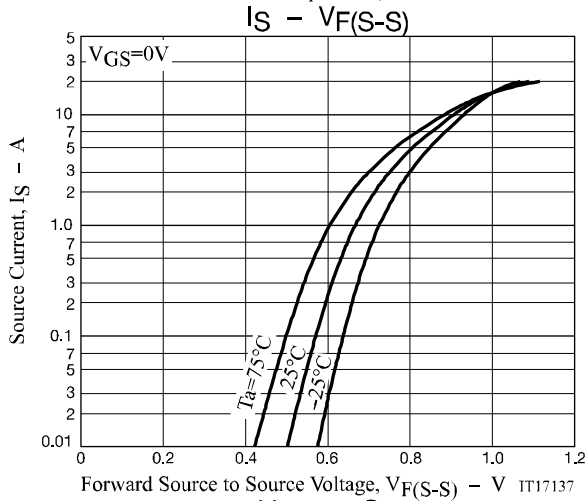
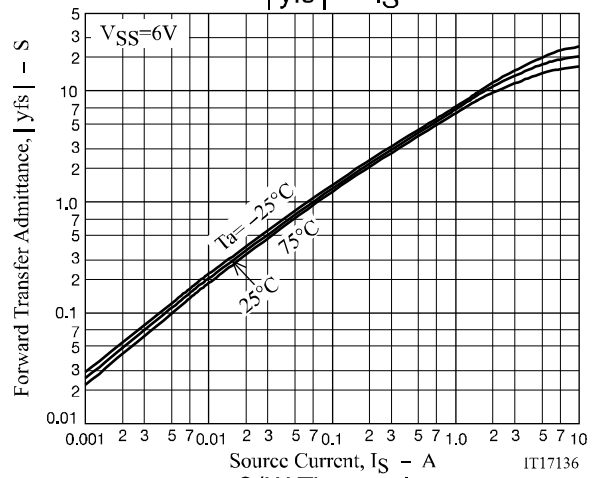
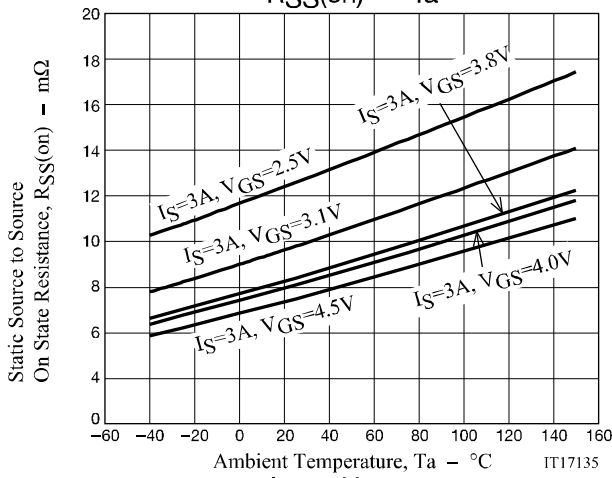
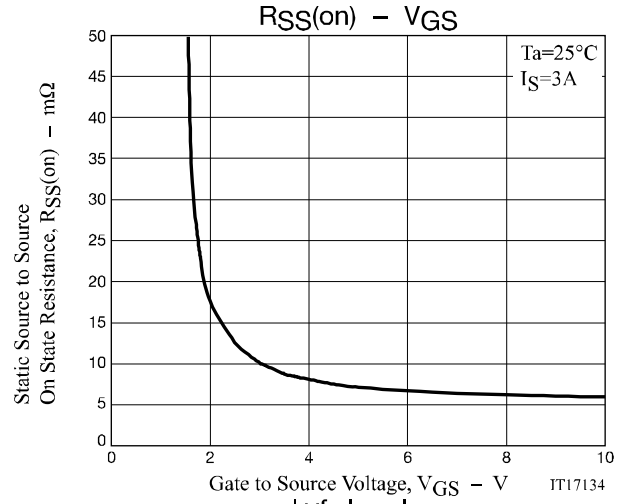
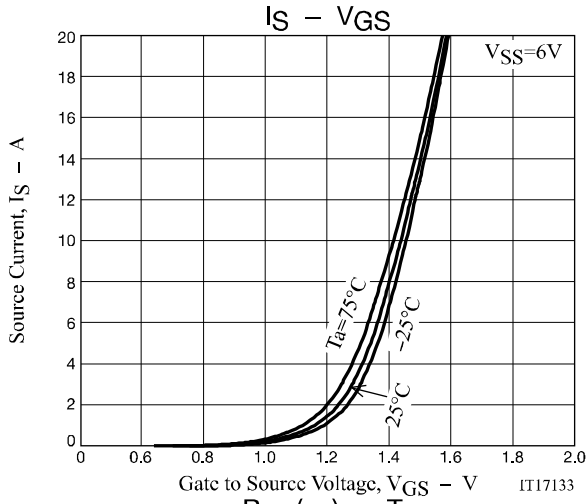
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 8  
V<sub>F(S-S)</sub>

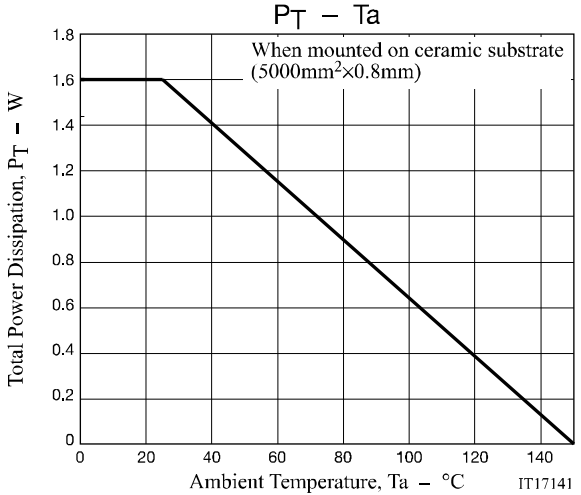


When FET1 is measured, +4.5V is added to V<sub>GS</sub> of FET2.

# EFC6604R



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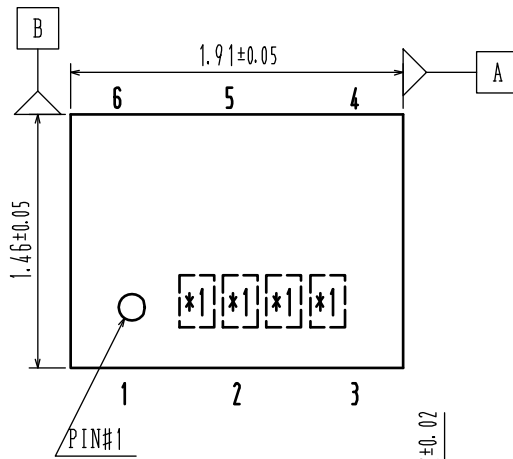
## Package Dimensions

EFC6604R-TR

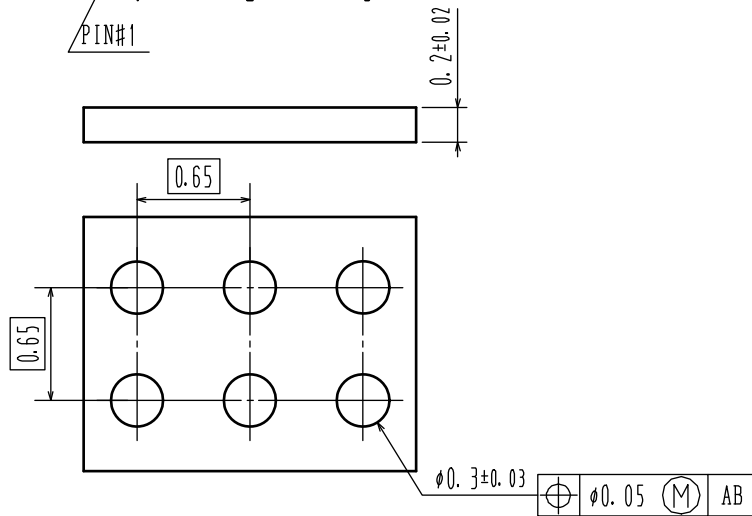
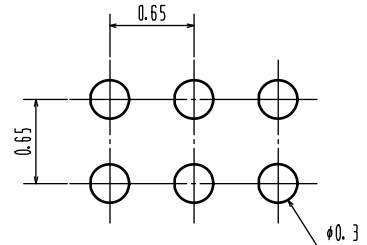
### EFCP1915-6CE-020

Unit : mm

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



### Land Pattern Example

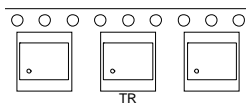


\*1: Lot indication

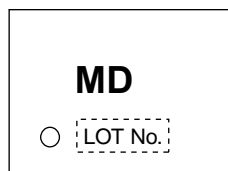
### Ordering & Package Information

Device	Package	Shipping	note
EFC6604R-TR	EFCP	5,000 pcs. / reel	Pb-Free and Halogen Free

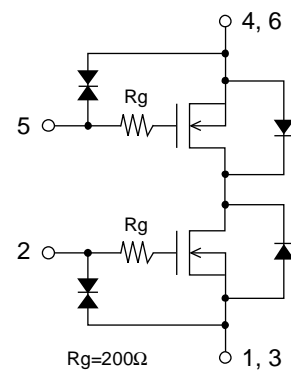
### Packing Type: TR



### Marking



### Electrical Connection



Note on usage : Since the EFC6604R is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
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#### Как с нами связаться

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