



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}		± 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 ² ×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 $T_a = 25^\circ\text{C}$

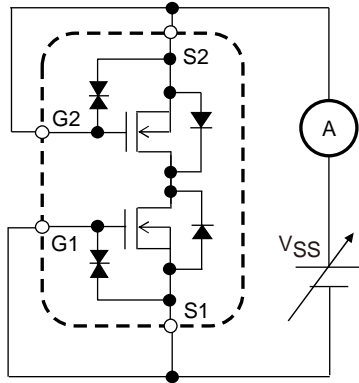
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Source to Source Breakdown Voltage	$V_{(BR)SSS}$	$I_S=1\text{mA}$, $V_{GS}=0\text{V}$ Test Circuit 1	12			V
Zero-Gate Voltage Source Current	I_{SSS}	$V_{SS}=10\text{V}$, $V_{GS}=0\text{V}$ Test Circuit 1			1	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS}=\pm 8\text{V}$, $V_{SS}=0\text{V}$ Test Circuit 2			± 1.0	μA
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

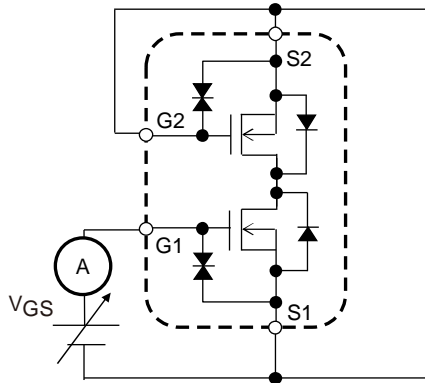
See detailed ordering and shipping information on page 5 of this data sheet.

Test circuits are example of measuring FET1 side

Test Circuit 1
I_{SSS}

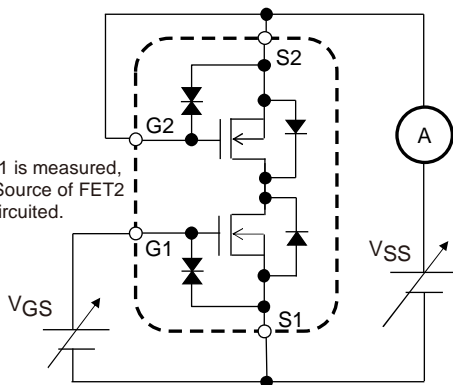


Test Circuit 2
I_{GSS}



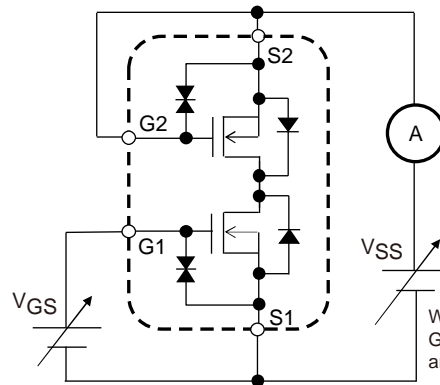
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 3
V_{GS(off)}



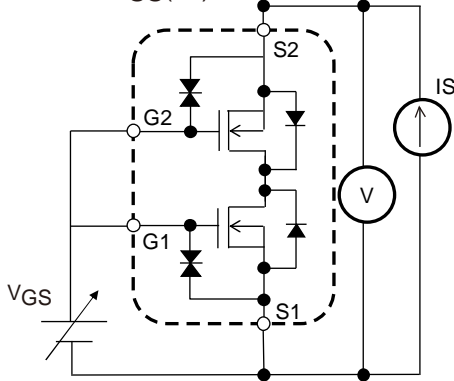
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 4
|y_{fs}|

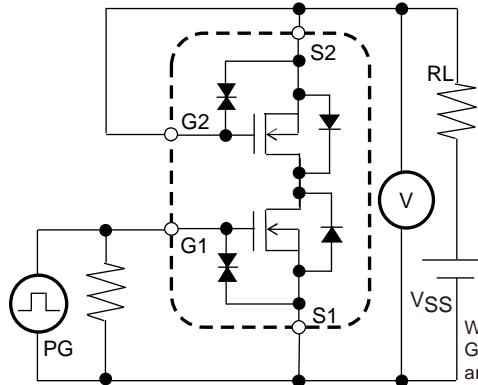


When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 5
R_{SS(on)}

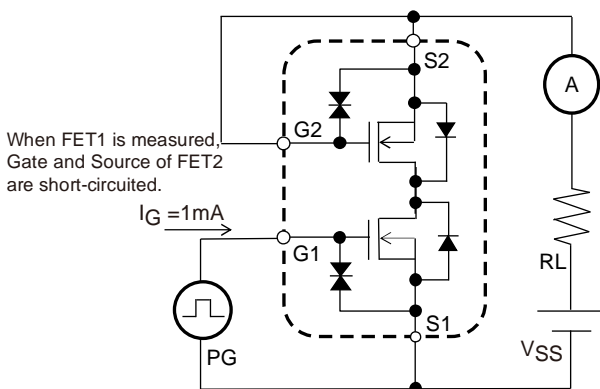


Test Circuit 6
t_{d(on)}, t_r, t_{d(off)}, t_f



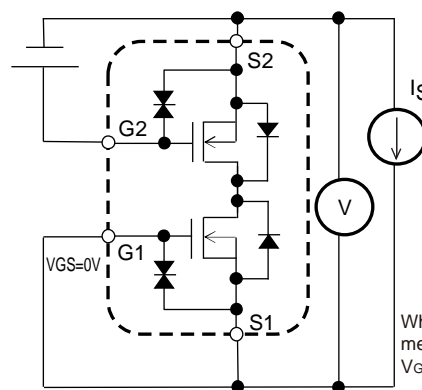
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 7
Q_g



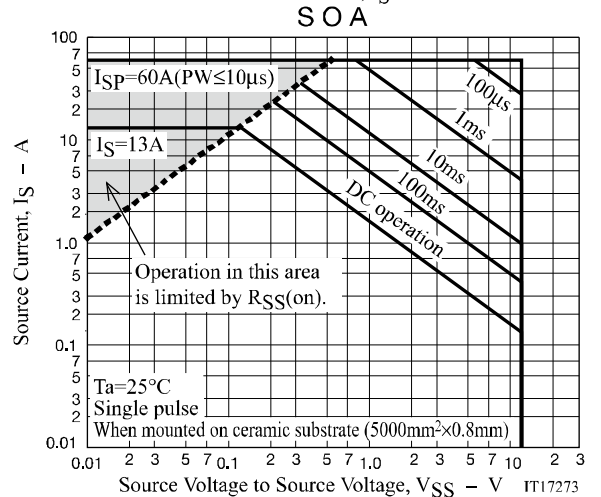
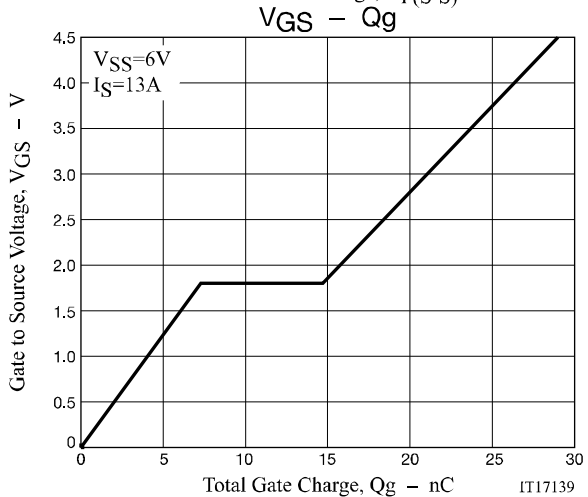
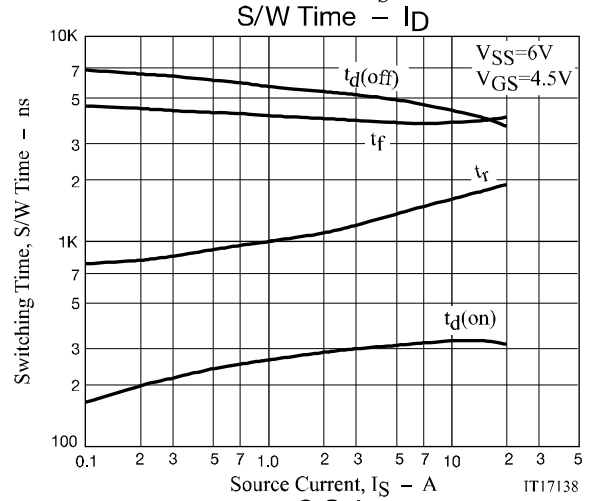
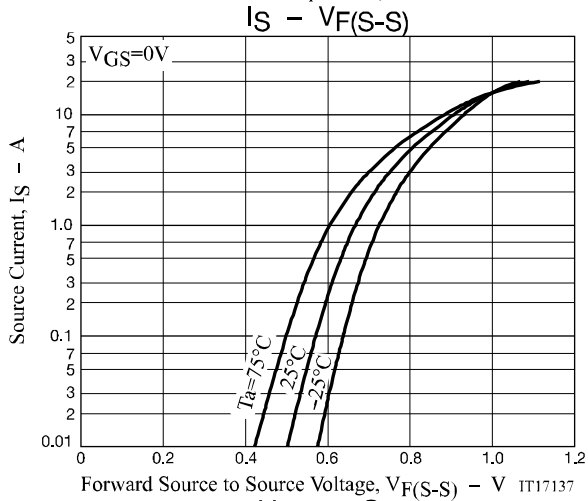
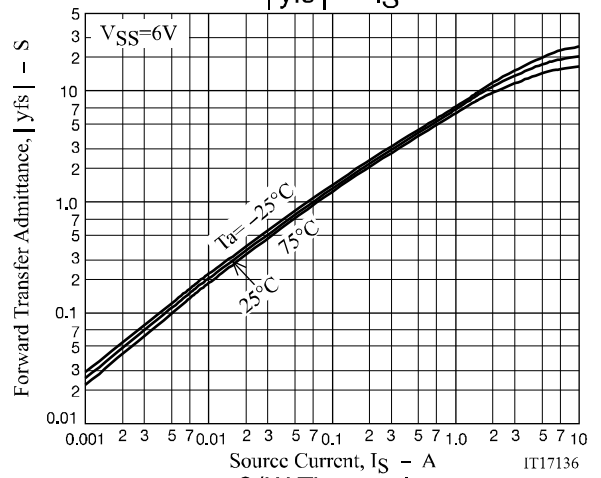
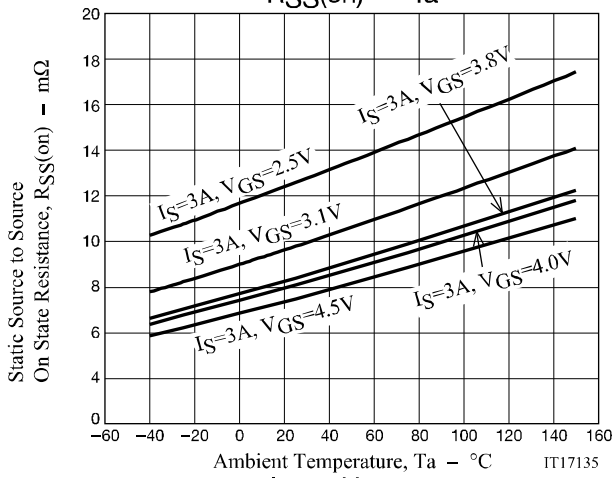
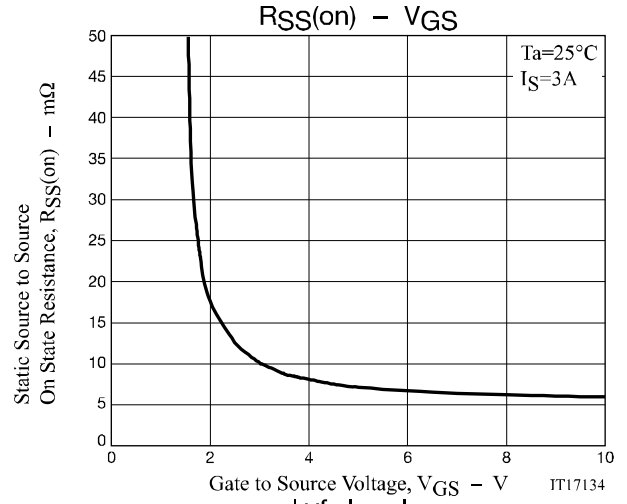
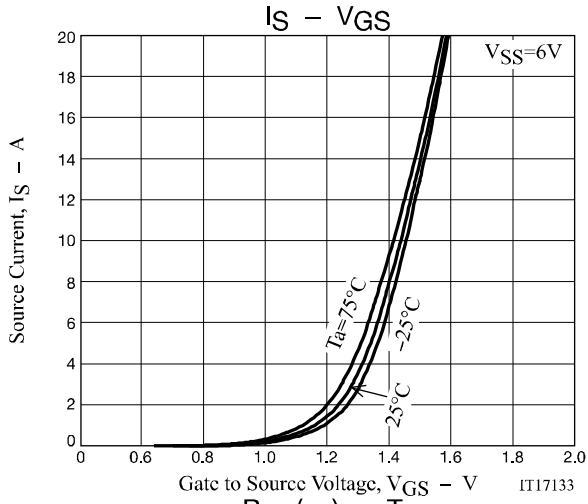
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 8
V_{F(S-S)}

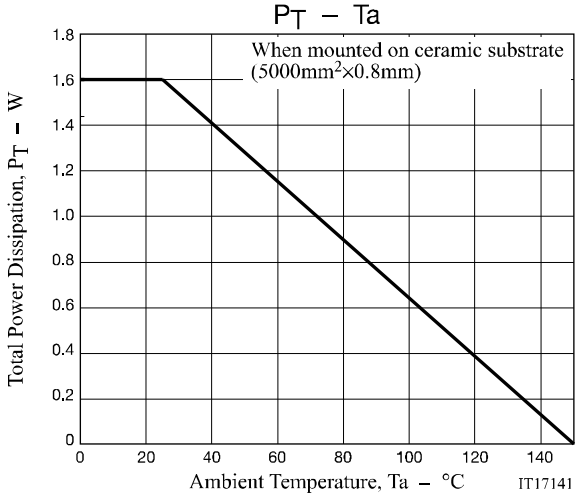


When FET1 is measured, +4.5V is added to V_{GS} of FET2.

EFC6604R



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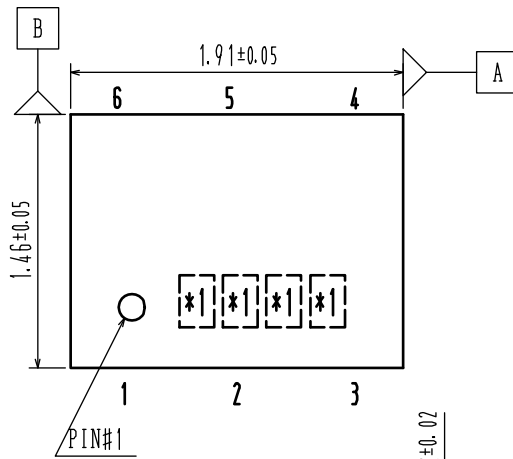
Package Dimensions

EFC6604R-TR

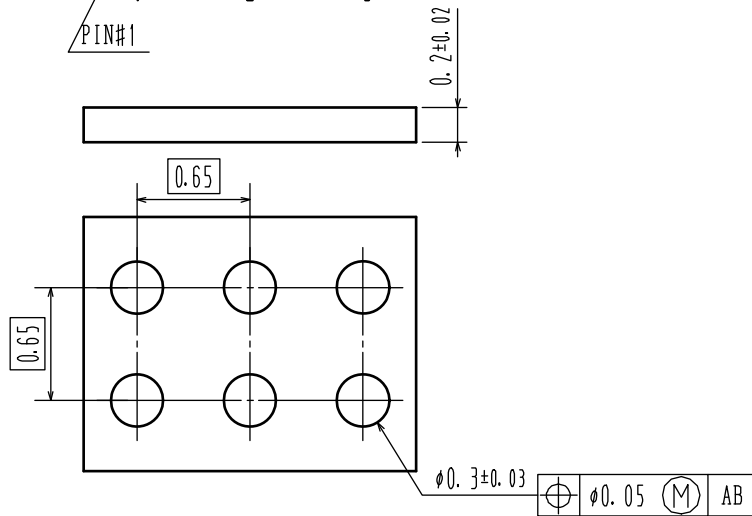
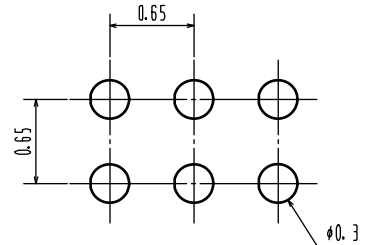
EFCP1915-6CE-020

Unit : mm

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



Land Pattern Example

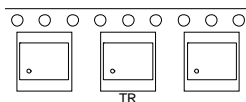


*1: Lot indication

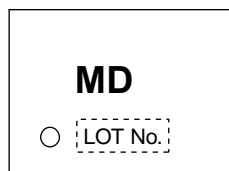
Ordering & Package Information

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

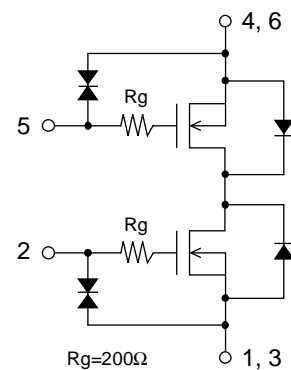
Packing Type: TR



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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