Ordering number : ENA2302

EFC6605R

N-Channel Power MOSFET
20V, 10A, 13.3mΩ, Dual EFCP

ON Semiconductor®

http://onsemi.com

Features

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

Applications

- Lithium-ion battery charging and discharging switch

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Value	Unit
Source to Source Voltage	V_{SSS}		20	V
Gate to Source Voltage	V_{GSS}		±10	V
Source Current (DC)	I_S		10	A
Source Current (Pulse)	I_{SP}	PW≤10μs, duty cycle≤1%	60	A
Total Dissipation	P_T	When mounted on ceramic substrate (5000mm^2×0.8mm)	1.6	W
Junction Temperature	T_j		150	°C
Storage Temperature	Tstg		- 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 When mounted on ceramic substrate (5000mm^2×0.8mm)	$R_{\theta JA}$	78.1	°C /W

Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions		Value min	Value typ	Value max	Unit
Source to Source Breakdown Voltage	$V(BR)_{SSS}$	I_S=1mA, V_{GS}=0V	Test Circuit 1	20			V
Zero-Gate Voltage Source Current	I_{SSS}	V_{SS}=20V, V_{GS}=0V	Test Circuit 1			1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=±8V, V_{SS}=0V	Test Circuit 2			±1.0	μA
Gate Threshold Voltage	V_{GS}(th)	V_{SS}10V, I_S=1mA	Test Circuit 3	0.5		1.3	V
Forward Transconductance	g_{FS}	V_{SS}=10V, I_S=3A	Test Circuit 4		11.4		S
Static Source to Source On-State Resistance	RSS(on)1	IS=3A, VGS=4.5V	Test Circuit 5	8.8	11.1	13.3	mΩ
	RSS(on)2	IS=3A, VGS=4.0V	Test Circuit 5	9.1	11.4	13.7	mΩ
	RSS(on)3	IS=3A, VGS=3.8V	Test Circuit 5	9.3	11.6	13.9	mΩ
	RSS(on)4	IS=3A, VGS=3.1V	Test Circuit 5	10.0	12.5	15.6	mΩ
	RSS(on)5	IS=3A, VGS=2.5V	Test Circuit 5	11.1	13.9	17.4	mΩ

Continued on next page.

ORDERING INFORMATION

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

Continued from preceding page.

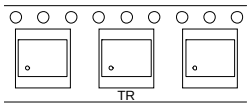
Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Turn-ON Delay Time	$t_{d(on)}$	V_{SS}=10V, V_{GS}=4.5V, I_S=3A Test Circuit 6		154		ns
Rise Time	t_r			678		ns
Turn-OFF Delay Time	$t_{d(off)}$			44400		ns
Fall Time	t_f			60800		ns
Total Gate Charge	Qg	V_{SS}=10V, V_{GS}=4.5V, I_S=10A Test Circuit 7		19.8		nC
Forward Source to Source Voltage	$V_{F(S-S)}$	I_S=3A, V_{GS}=0V Test Circuit 8		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.

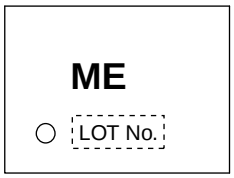
Ordering & Package Information

Device	Package	Shipping	note
EFC6605R-TR	EFCP	5,000 pcs. / reel	Pb-Free and Halogen Free

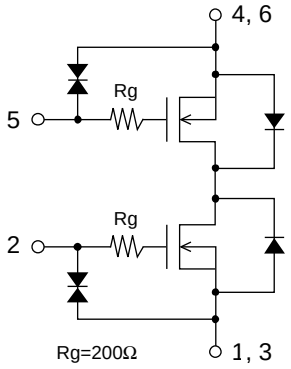
Packing Type: TR



Marking

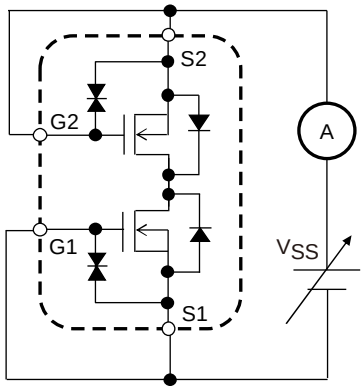


Electrical Connection

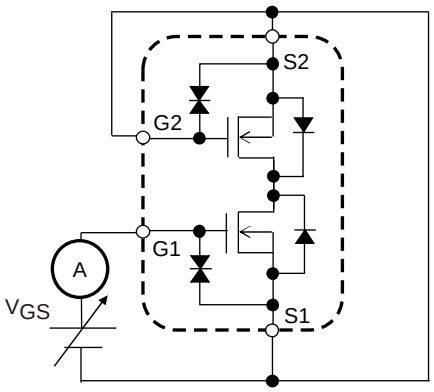


Test circuits are example of measuring FET1 side

Test Circuit 1
I_{SSS}

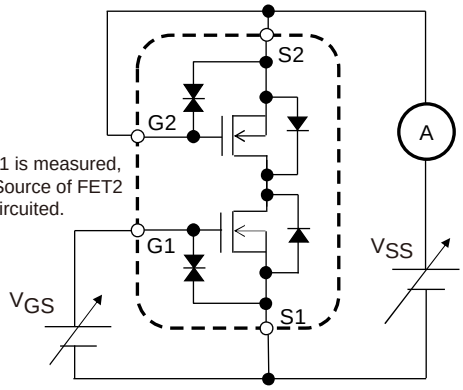


Test Circuit 2
I_{GSS}



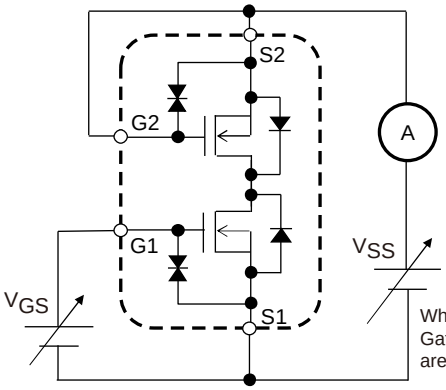
When FET1 is measured, Gate and Source of FET2 are short-circuited.

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



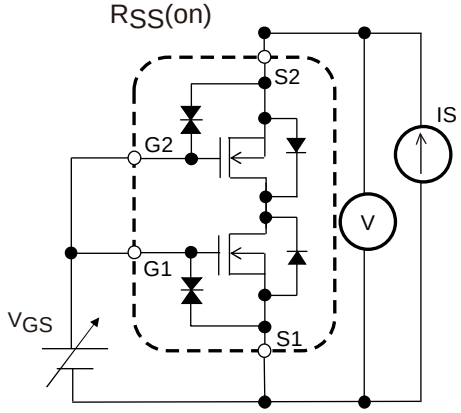
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 4
g_{FS}

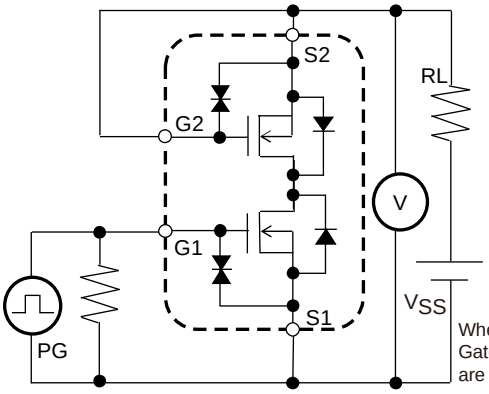


When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 5
$R_{SS(on)}$

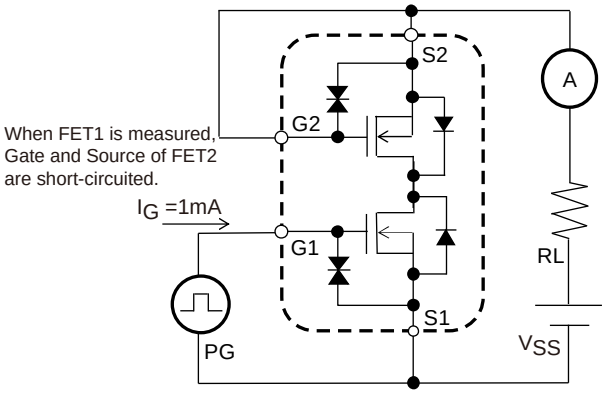


Test Circuit 6
$t_{d(on)}$, t_r, $t_{d(off)}$, t_f



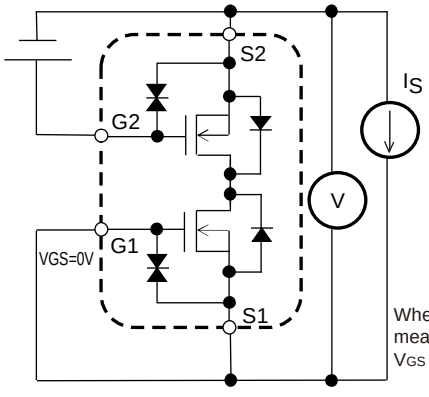
When FET1 is measured, Gate and Source of FET2 are short-circuited.

Test Circuit 7
Qg



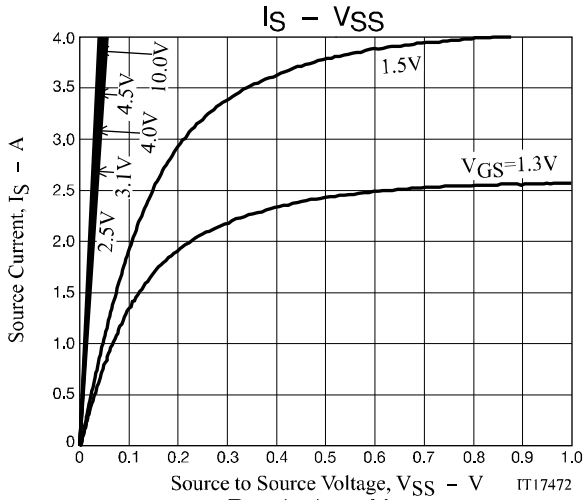
When FET1 is measured, Gate and Source of FET2 are short-circuited.

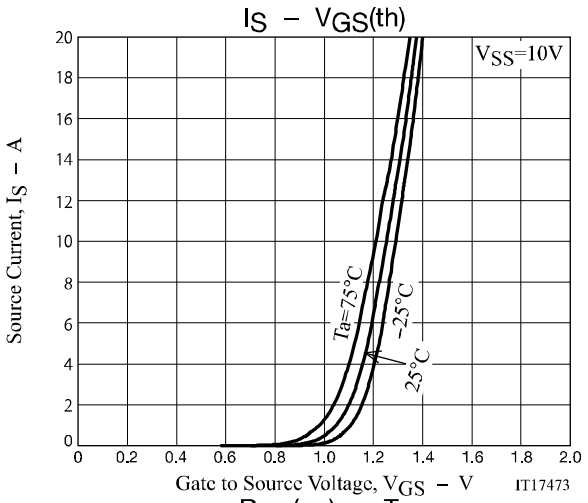
Test Circuit 8
$V_{F(S-S)}$

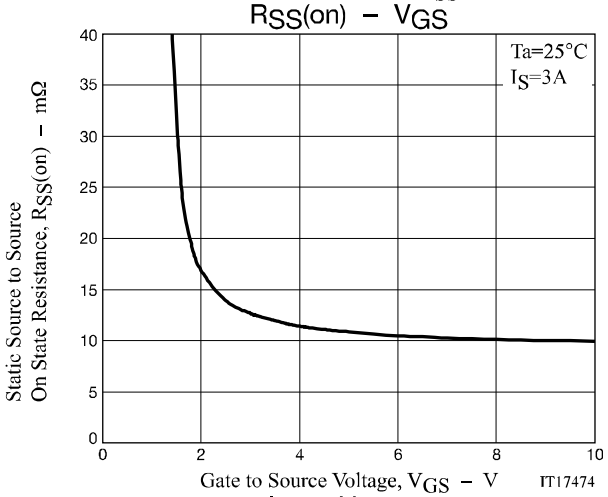


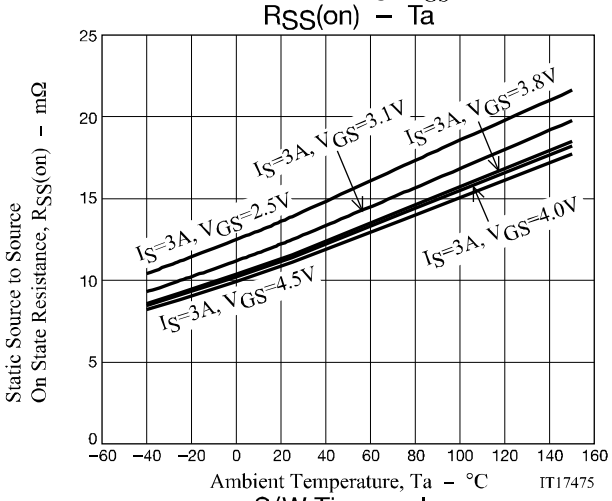
When FET1 is measured,+4.5V is added to V_{GS} of FET2.

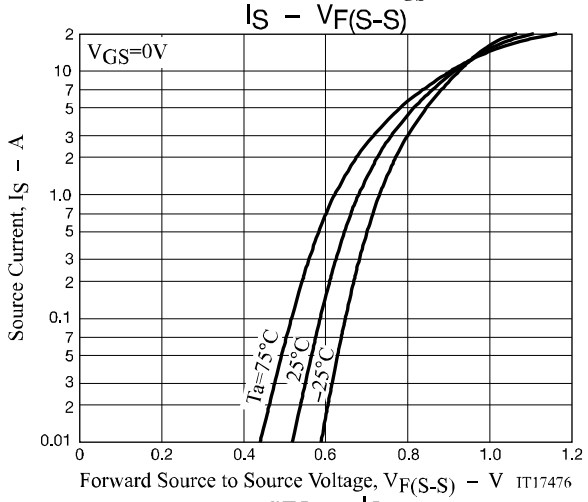
When FET2 is measured, the position of FET1 and FET2 is switched.

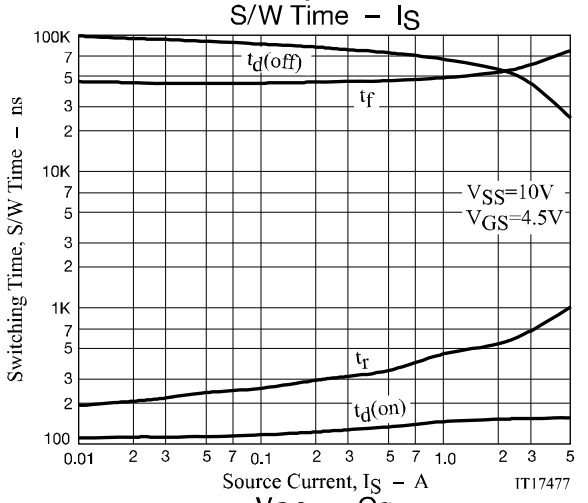

IS – VSS
Source Current, IS – A
Source to Source Voltage, VSS – V
IT17472
1.5V
10.0V
4.5V
4.0V
3.1V
2.5V
VGS=1.3V

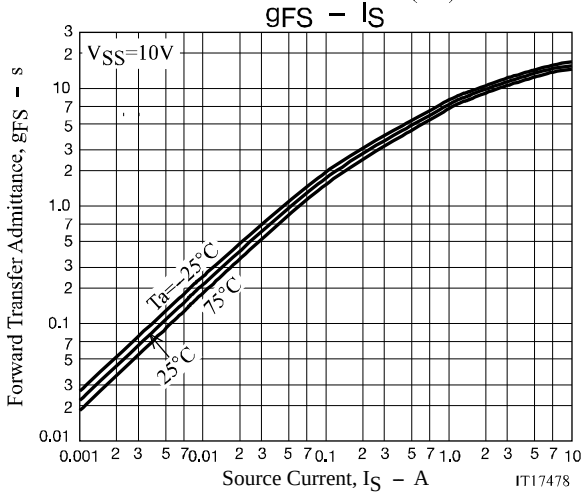

IS – VGS(th)
Source Current, IS – A
Gate to Source Voltage, VGS – V
IT17473
VSS=10V
Ta=75°C
–25°C
25°C

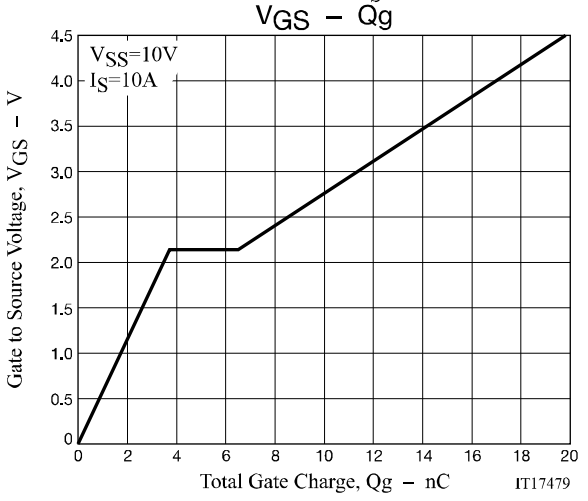

RSS(on) – VGS
Static Source to Source
On State Resistance, RSS(on) – mΩ
Gate to Source Voltage, VGS – V
IT17474
Ta=25°C
IS=3A

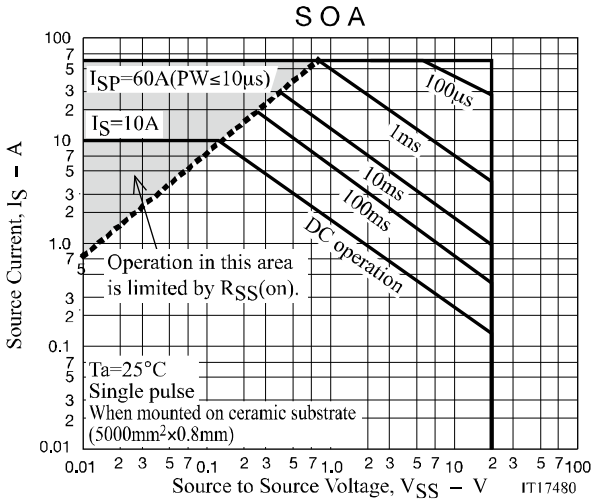

RSS(on) – Ta
Static Source to Source
On State Resistance, RSS(on) – mΩ
Ambient Temperature, Ta – °C
IT17475
IS=3A, VGS=2.5V
IS=3A, VGS=3.1V
IS=3A, VGS=3.8V
IS=3A, VGS=4.0V
IS=3A, VGS=4.5V

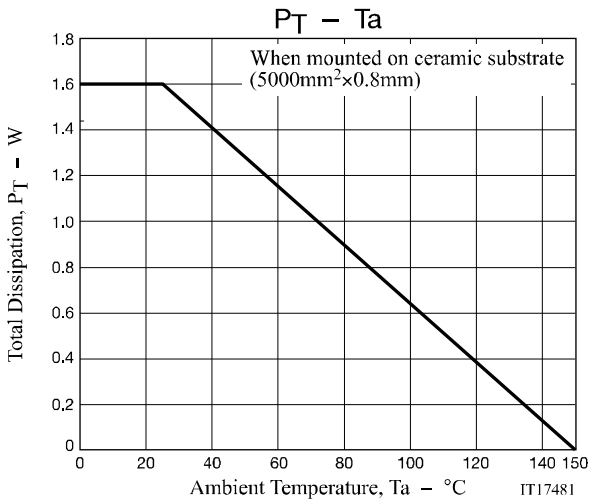

IS – VF(S-S)
Source Current, IS – A
Forward Source to Source Voltage, VF(S-S) – V
IT17476
VGS=0V
Ta=75°C
25°C
–25°C

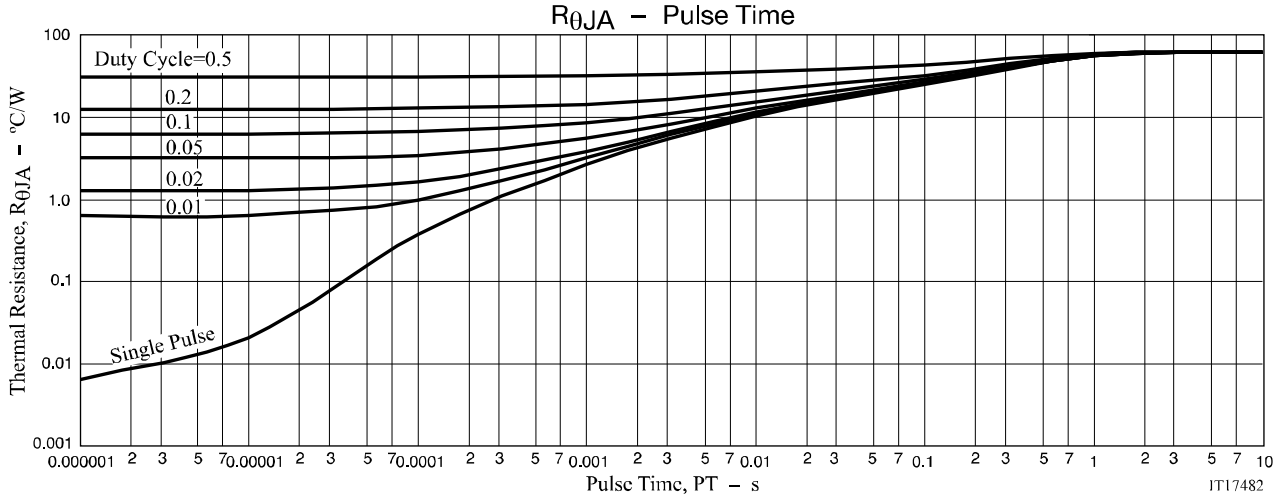

S/W Time – IS
Switching Time, S/W Time – ns
Source Current, IS – A
IT17477
td(off)
tf
VSS=10V
VGS=4.5V
tr
td(on)


gFS – IS
Forward Transfer Admittance, gFS – s
Source Current, IS – A
IT17478
VSS=10V
Ta=–25°C
75°C
25°C


VGS – Qg
Gate to Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT17479
VSS=10V
IS=10A


SOA
ISP=60A(PW≤10μs)
IS=10A
100μs
1ms
10ms
100ms
DC operation
Operation in this area
is limited by RSS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate
(5000mm²×0.8mm)
Source Current, IS – A
Source to Source Voltage, VSS – V
IT17480


PT – Ta
When mounted on ceramic substrate
(5000mm²×0.8mm)
Total Dissipation, PT – W
Ambient Temperature, Ta – °C
IT17481


RθJA – Pulse Time
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Thermal Resistance, RθJA – °C/W
Pulse Time, PT – s
IT17482

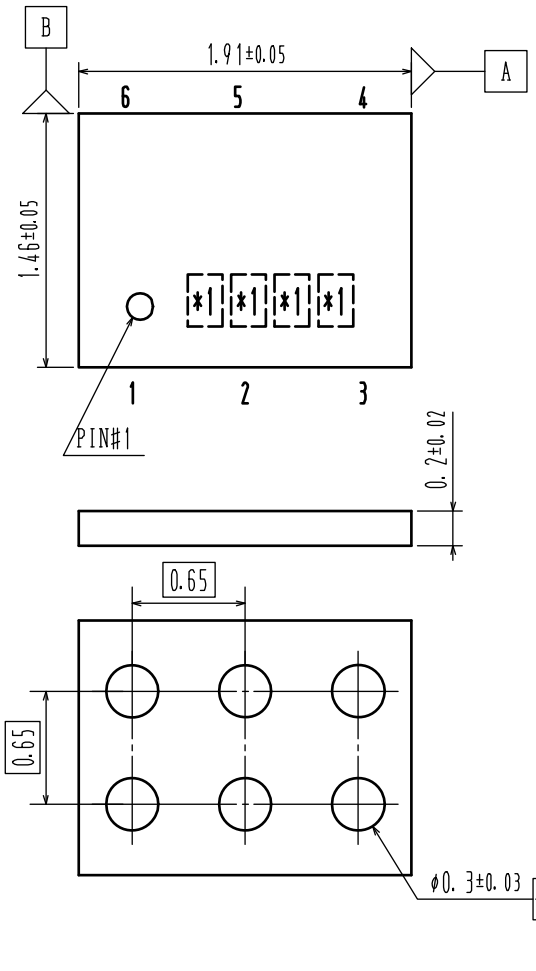
Package Dimensions

EFC6605R-TR

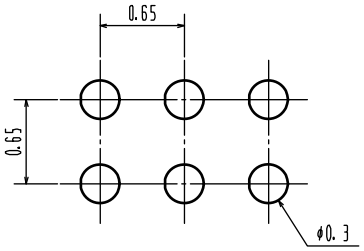
EFCP1915-6CE-020

unit : mm

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



Recommended Soldering Footprint



Note on usage : Since the EFC6605R is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

Mouser Electronics

Authorized Distributor

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ON Semiconductor:

EFC6605R-TR