EFC6611R

N-Channel Power MOSFET
12V, 27A, 3.2mΩ, Dual EFCP
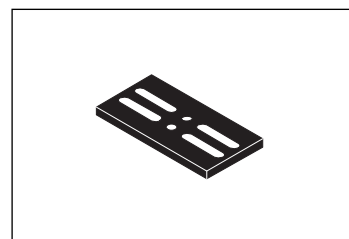
ON Semiconductor®

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

EFCP3517-6DGH-020

Specifications

Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Value	Unit
Source to Source Voltage	V_{SSS}		12	V
Gate to Source Voltage	V_{GSS}		±8	V
Source Current (DC)	I_S		27	A
Source Current (Pulse)	I_{SP}	PW≤100μs, duty cycle≤1%	100	A
Total Dissipation	P_T	When mounted on ceramic substrate (5000mm²×0.8mm)	2.5	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 (5000mm²×0.8mm)	$R_{\theta JA}$	50	°C /W

Electrical Characteristics at Ta = 25°C

Parameter	Symbol	Conditions		Value			Unit
				min	typ	max	
Source to Source Breakdown Voltage	$V(BR)_{SSS}$	I_S=1mA, V_{GS}=0V	Test Circuit 1	12			V
Zero-Gate Voltage Source Current	I_{SSS}	V_{SS}=10V, 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	μA
Gate Threshold Voltage	V_{GS}(th)	V_{SS}=6V, I_S=1mA	Test Circuit 3	0.5		1.3	V
Forward Transconductance	g_{FS}	V_{SS}=6V, I_S=3A	Test Circuit 4		19		S

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	
Static Source to Source On-State Resistance	$R_{SS}(on)1$	I_S=5A, V_{GS}=4.5V	Test Circuit 5	1.8	2.3	3.2	mΩ
	$R_{SS}(on)2$	I_S=5A, V_{GS}=4.0V	Test Circuit 5	1.9	2.4	3.2	mΩ
	$R_{SS}(on)3$	I_S=5A, V_{GS}=3.8V	Test Circuit 5	2	2.6	3.2	mΩ
	$R_{SS}(on)4$	I_S=5A, V_{GS}=3.1V	Test Circuit 5	2.1	3.3	4.4	mΩ
	$R_{SS}(on)5$	I_S=5A, V_{GS}=2.5V	Test Circuit 5	2.7	4.0	6.3	mΩ
Turn-ON Delay Time	$t_d(on)$	V_{SS}=6V, V_{GS}=4.5V, I_S=3A Test Circuit 6			80		ns
Rise Time	t_r				570		ns
Turn-OFF Delay Time	$t_d(off)$				38,000		ns
Fall Time	t_f				17,700		ns
Total Gate Charge	Qg	V_{SS}=6V, V_{GS}=4.5V, I_S=27A Test Circuit 7			100		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.
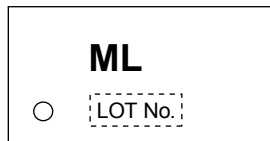
Ordering & Package Information

Device	Package	Shipping	note
EFC6611R-TF	EFCP	5,000 pcs. / reel	Pb-Free and Halogen Free

Packing Type: TF

Marking

ML

○ LOT No.
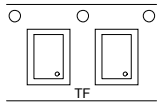
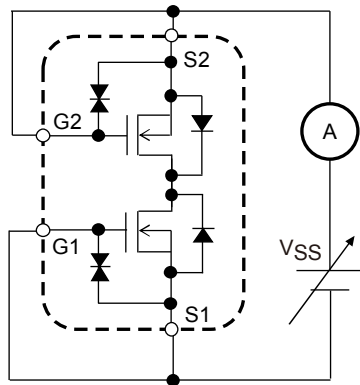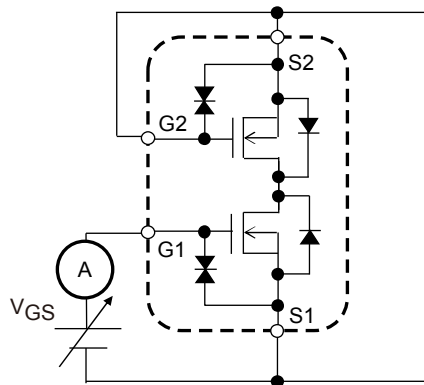## Electrical Connection

Rg=200Ω
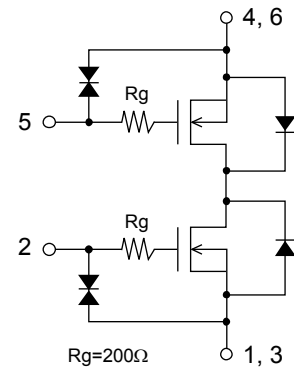
Test circuits are example of measuring FET1 side
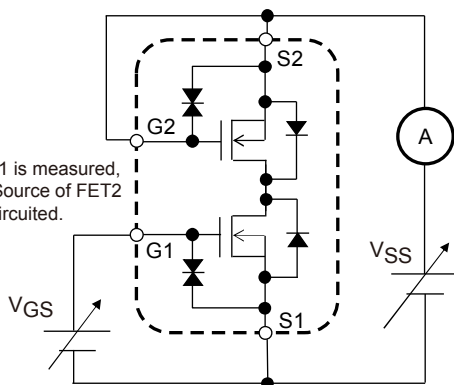
Test Circuit 1
I_{SSS}
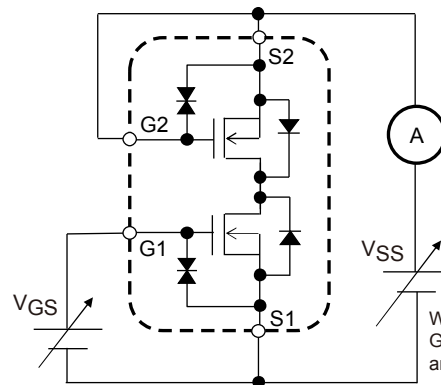

Test Circuit 2
I_{GSS}

When FET1 is measured, Gate and Source of FET2 are short-circuited.
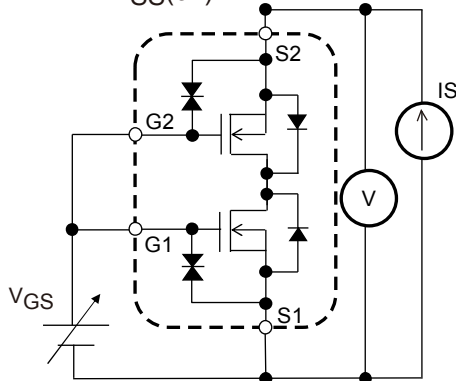
Test Circuit 3
$V_{GS}(th)$

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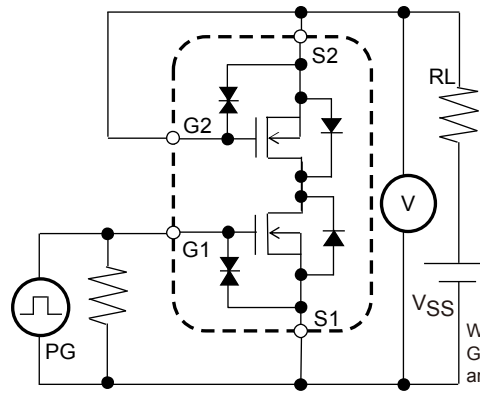

Test Circuit 4
gFS

When FET1 is measured, Gate and Source of FET2 are short-circuited.
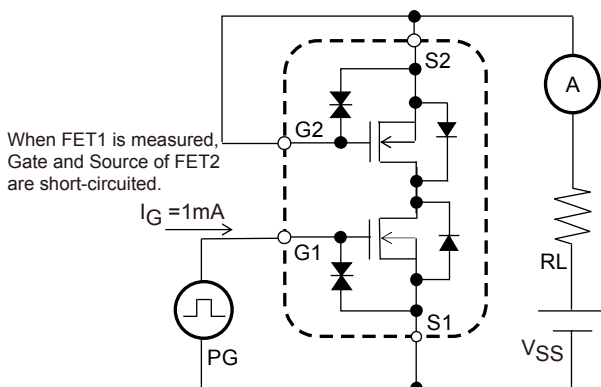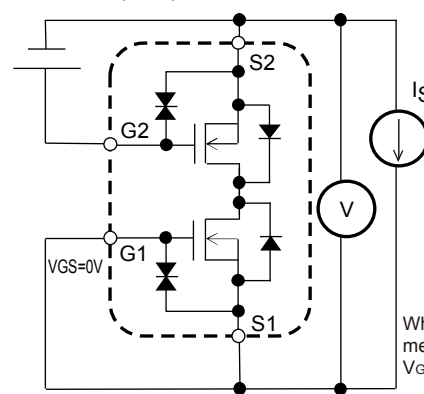
Test Circuit 5
$R_{SS}(on)$

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.
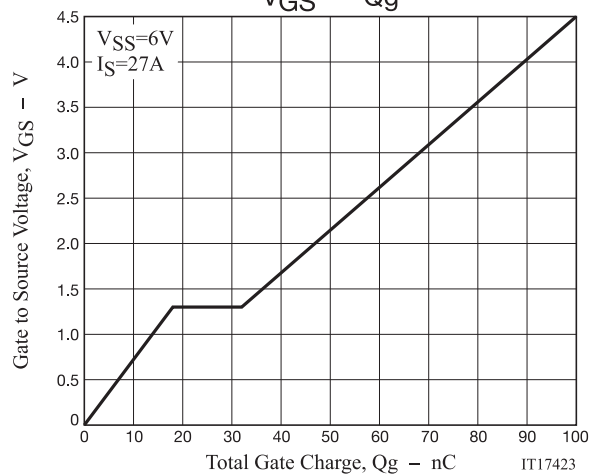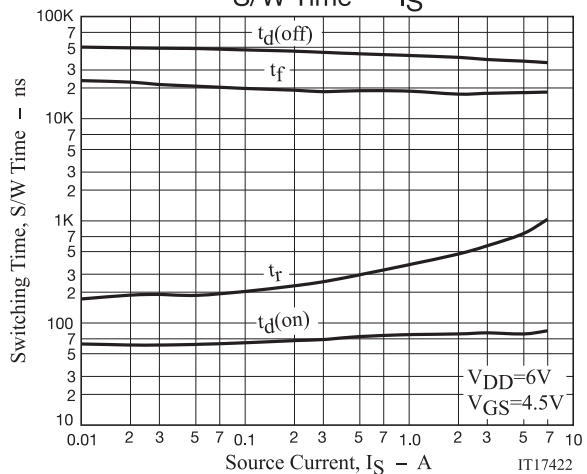
Test Circuit 7
Qg

When FET1 is measured, Gate and Source of FET2 are short-circuited.
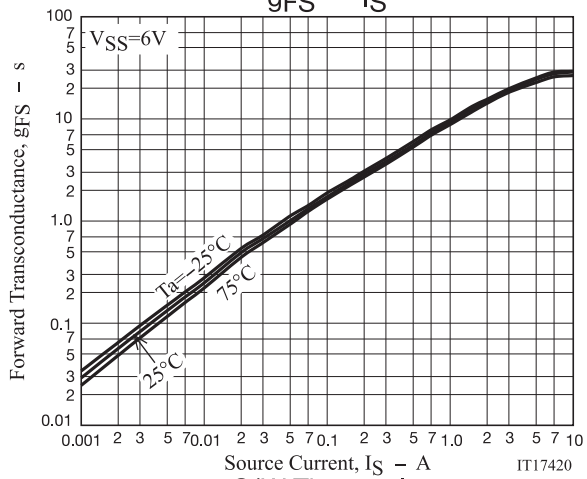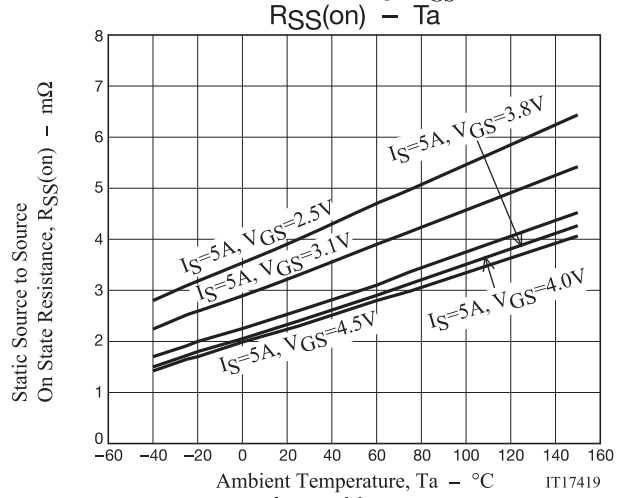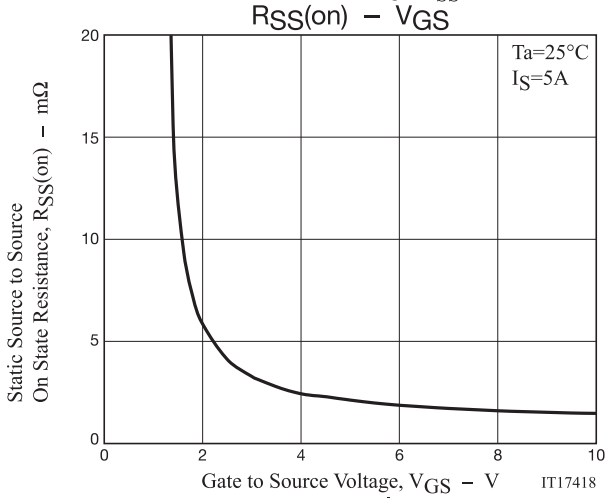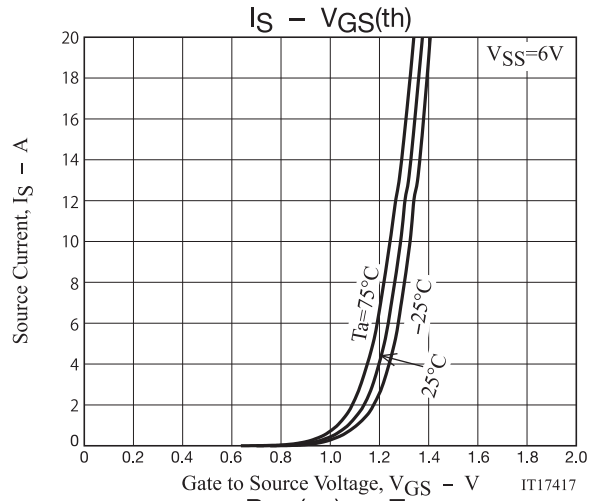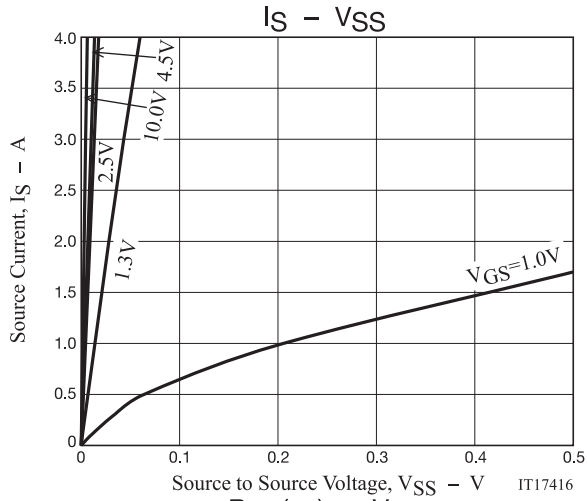
$I_G =1mA$

Test Circuit 8
$V_F(S-S)$
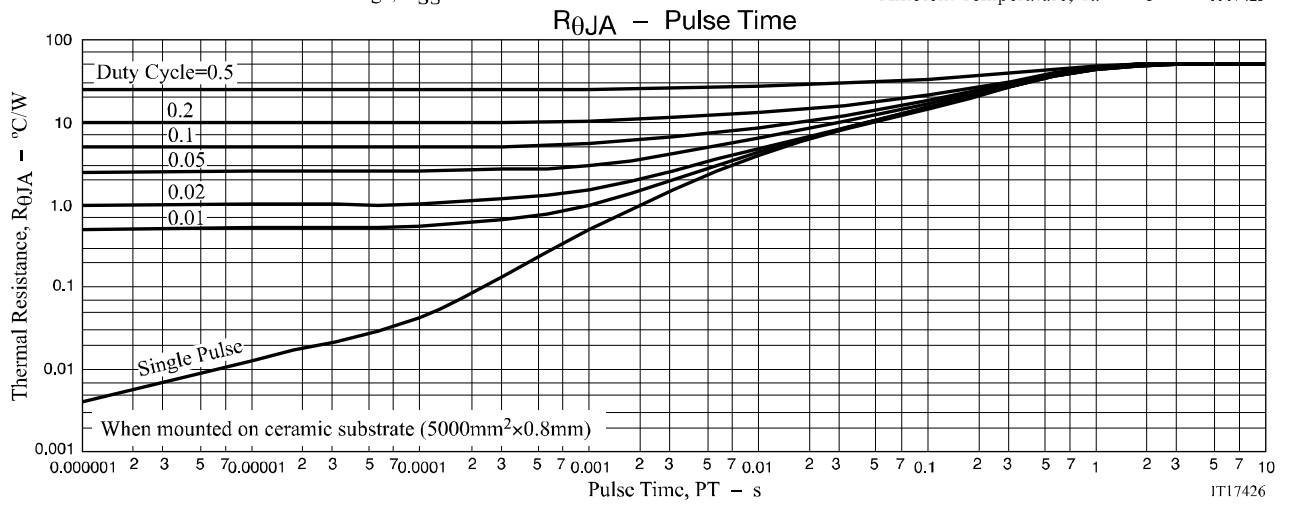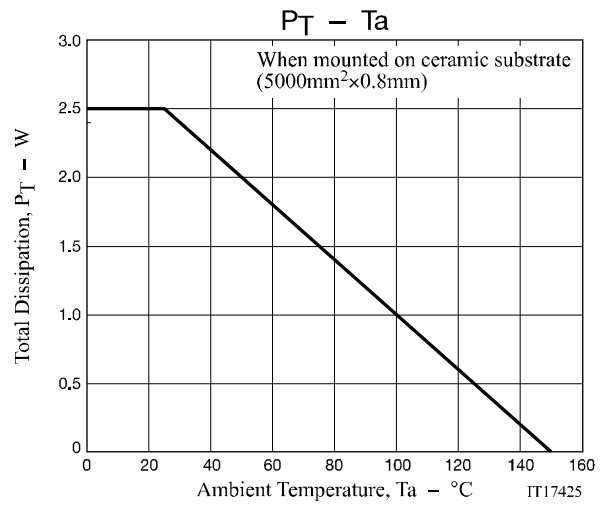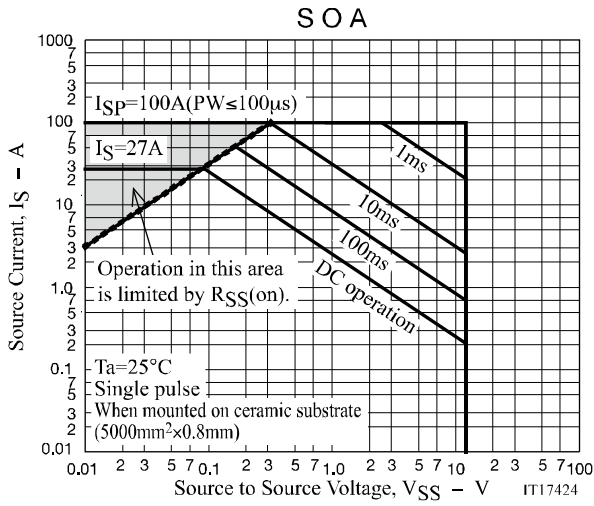

When FET1 is measured,+4.5V is added to VGS of FET2.

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

$I_S - V_{SS}$

Source Current, I_S – A vs Source to Source Voltage, V_{SS} – V

$V_{GS}=1.0V$, 2.5V, 1.3V, 10.0V, 4.5V

IT17416

$I_S - V_{GS(th)}$

Source Current, I_S – A vs Gate to Source Voltage, V_{GS} – V

$V_{SS}=6V$

$Ta=75°C$, $-25°C$, $25°C$

IT17417

$R_{SS(on)} - V_{GS}$

Static Source to Source On State Resistance, $R_{SS(on)}$ – mΩ vs Gate to Source Voltage, V_{GS} – V

$Ta=25°C$
$I_S=5A$

IT17418

$R_{SS(on)} - Ta$

Static Source to Source On State Resistance, $R_{SS(on)}$ – mΩ vs Ambient Temperature, Ta – °C

$I_S=5A, V_{GS}=3.8V$
$I_S=5A, V_{GS}=2.5V$
$I_S=5A, V_{GS}=3.1V$
$I_S=5A, V_{GS}=4.0V$
$I_S=5A, V_{GS}=4.5V$

IT17419

$g_{FS} - I_S$

Forward Transconductance, g_{FS} – s vs Source Current, I_S – A

$V_{SS}=6V$

$Ta=-25°C$, $75°C$, $25°C$

IT17420

$I_S - V_{F(S-S)}$

Source Current, I_S – A vs Forward Source to Source Voltage, $V_{F(S-S)}$ – V

$V_{GS}=0V$

$Ta=75°C$, $25°C$, $-25°C$

IT17421

S/W Time – I_S

Switching Time, S/W Time – ns vs Source Current, I_S – A

$t_{d(off)}$
t_f
t_r
$t_{d(on)}$

$V_{DD}=6V$
$V_{GS}=4.5V$

IT17422

$V_{GS} - Q_g$

Gate to Source Voltage, V_{GS} – V vs Total Gate Charge, Q_g – nC

$V_{SS}=6V$
$I_S=27A$

IT17423

S O A

I_{SP}=100A(PW≤100μs)

I_S=27A

Operation in this area is limited by R_{SS}(on).

Ta=25°C
Single pulse
When mounted on ceramic substrate
(5000mm²×0.8mm)

1ms
10ms
100ms
DC operation

Source Current, I_S – A

Source to Source Voltage, V_{SS} – V   IT17424

P_T – Ta

When mounted on ceramic substrate
(5000mm²×0.8mm)

Total Dissipation, P_T – W

Ambient Temperature, Ta – °C   IT17425

$R_{θJA}$ – Pulse Time

Duty Cycle=0.5

0.2
0.1
0.05
0.02
0.01

Single Pulse

When mounted on ceramic substrate (5000mm²×0.8mm)

Thermal Resistance, $R_{θJA}$ – °C/W

Pulse Time, PT – s   IT17426

Package Dimensions

unit : mm
EFC6611R-TF

CSP6, 1.77x3.54 / EFCP3517-6DGH-20
CASE 568AL
ISSUE O

TOP VIEW

PIN A1
REFERENCE

2X ⌓ 0.05 C

2X ⌓ 0.05 C

‖ 0.03 C

⌓ 0.03 C

SIDE VIEW

C SEATING PLANE

BOTTOM VIEW

2X ⌀ b

⊕ 0.05 C A B
0.03 C

4X b1
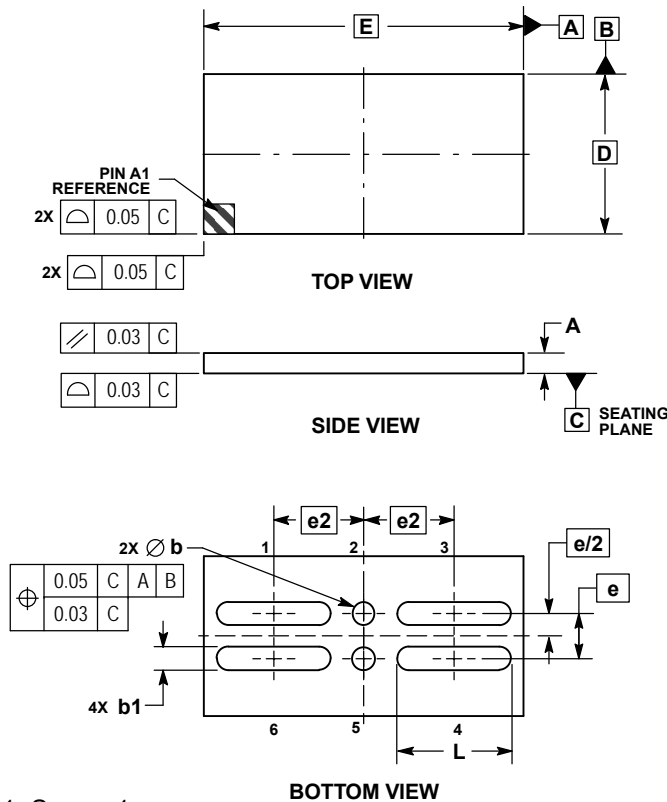
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.

DIM	MILLIMETERS	
	MIN	MAX
A	---	0.22
b	0.22	0.28
b1	0.22	0.28
D	1.77 BSC	
E	3.54 BSC	
e	0.50 BSC	
e2	1.00 BSC	
L	1.22	1.28

RECOMMENDED SOLDERING FOOTPRINT*

8X R0.125
2X ⌀ 0.25
4X 1.25
PACKAGE OUTLINE
0.50 PITCH
2.00 PITCH
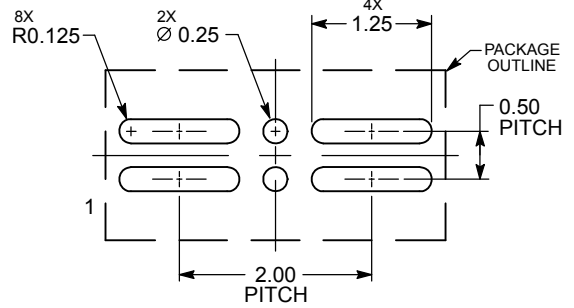
DIMENSIONS: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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

Note on usage : Since the EFC6611R is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.