

MOSFET – Power, Dual N-Channel, for 1-Cell Lithium-ion Battery Protection

12 V, 3.2 mΩ, 27 A

EFC8811R

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-cell 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-Cell Lithium-ion Battery Charging and Discharging Switch

SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

| Parameter | Symbol | 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) PW ≤ 100 μs, Duty Cycle ≤ 1% | I _{SP} | 100 | A |
| Total Dissipation Surface mounted on ceramic substrate (5000 mm ² x 0.8 mm) | P _T | 2.5 | W |
| Junction Temperature | T _j | 150 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |

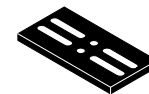
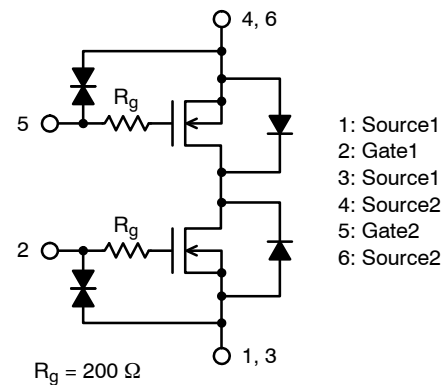
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL RESISTANCE RATINGS

| Parameter | Symbol | Value | Unit |
|--|------------------|-------|------|
| Junction to Ambient Surface mounted on ceramic substrate (5000 mm ² x 0.8 mm) | R _{θJA} | 50 | °C/W |

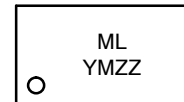
| V _{SSS} | R _{SS(on)} MAX | I _S MAX |
|------------------|-------------------------|--------------------|
| 12 V | 3.2 mΩ @ 4.5 V | 27 A |
| | 3.2 mΩ @ 4.0 V | |
| | 3.2 mΩ @ 3.8 V | |
| | 4.4 mΩ @ 3.1 V | |
| | 6.3 mΩ @ 2.5 V | |

ELECTRICAL CONNECTION N-Channel



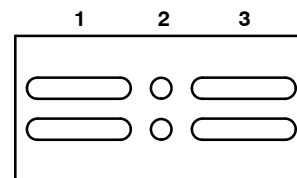
CSP6, 1.77x3.54/
EFCP3517-6DGH-020
CASE 568AL

MARKING DIAGRAM



ML = Device Code
Y = Year of Production
M = Month of Assembly Operation
ZZ = Assembly Lot Number

PIN CONNECTIONS



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

ORDERING INFORMATION

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

EFC8811R

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

| Parameter | Symbol | Test Condition | Min | Typ | Max | Unit |
|---|----------------------|---|-----|--------|-----|------|
| Source to Source Breakdown Voltage | V _{(BR)SSS} | I _S = 1 mA, V _{GS} = 0 V (Test Circuit 1) | 12 | – | – | V |
| Zero-Gate Voltage Source Current | I _{SSS} | V _{SS} = 10 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} = 6 V, I _S = 1 mA (Test Circuit 3) | 0.5 | – | 1.3 | V |
| Forward Transconductance | g _{FS} | V _{SS} = 6 V, I _S = 3 A (Test Circuit 4) | – | 19 | – | S |
| Static Source to Source On-State Resistance | R _{SS(on)1} | I _S = 5 A, V _{GS} = 4.5 V (Test Circuit 5) | 1.8 | 2.3 | 3.2 | mΩ |
| | R _{SS(on)2} | I _S = 5 A, V _{GS} = 4.0 V (Test Circuit 5) | 1.9 | 2.4 | 3.2 | mΩ |
| | R _{SS(on)3} | I _S = 5 A, V _{GS} = 3.8 V (Test Circuit 5) | 2.0 | 2.6 | 3.2 | mΩ |
| | R _{SS(on)4} | I _S = 5 A, V _{GS} = 3.1 V (Test Circuit 5) | 2.1 | 3.3 | 4.4 | mΩ |
| | R _{SS(on)5} | I _S = 5 A, V _{GS} = 2.5 V (Test Circuit 5) | 2.7 | 4.0 | 6.3 | mΩ |
| Turn-ON Delay Time | t _{d(on)} | V _{SS} = 6 V, V _{GS} = 4.5 V, I _S = 3 A (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 | Q _g | V _{SS} = 6 V, V _{GS} = 4.5 V, I _S = 27 A (Test Circuit 7) | – | 100 | – | nC |
| Forward Source to Source Voltage | V _{F(S-S)} | I _S = 3 A, V _{GS} = 0 V (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 INFORMATION

| Device | Marking | Package | Shipping (Qty / Packing) [†] |
|-------------|---------|--|---------------------------------------|
| EFC8811R-TF | ML | CSP6, 1.77 × 3.54 EFCP3517-6DGH-020 (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](#).

TEST CIRCUITS ARE EXAMPLE OF MEASURING FET1 SIDE

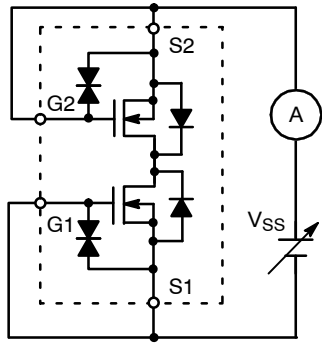


Figure 1. Test Circuit 1 - V_{SS}/I_{SS}

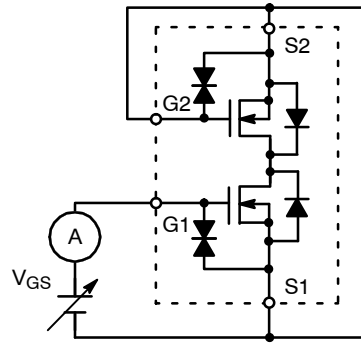


Figure 2. Test Circuit 2 - I_{GSS}

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

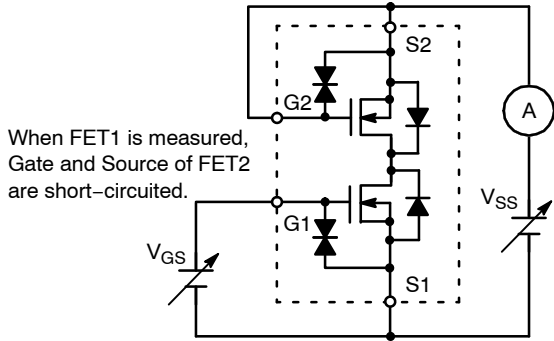


Figure 3. Test Circuit 3 - $V_{GS(th)}$

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

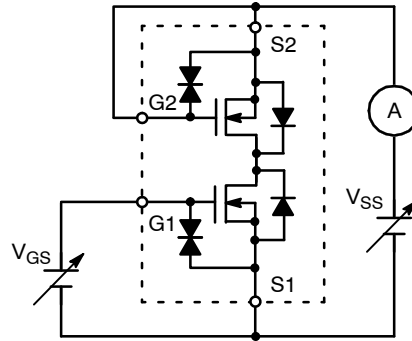


Figure 4. Test Circuit 4 - g_{FS}

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

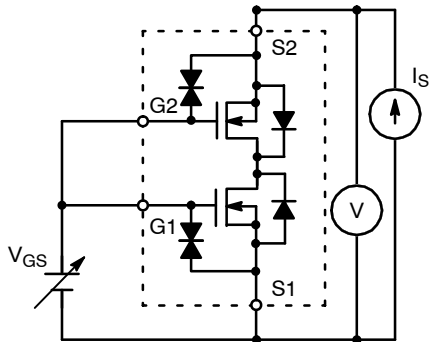


Figure 5. Test Circuit 5 - $R_{SS(on)}$

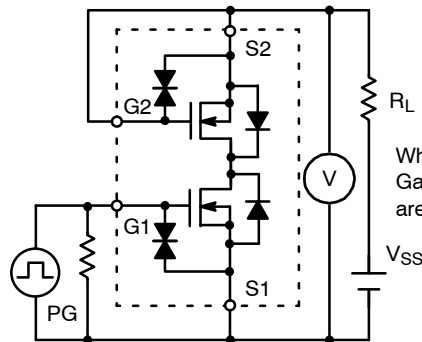


Figure 6. Test Circuit 6 - $t_{d(on)}$, t_r , $t_{d(off)}$, t_f

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

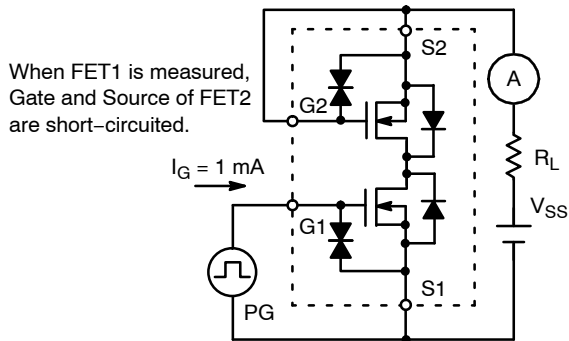


Figure 7. Test Circuit 7 - Q_g

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

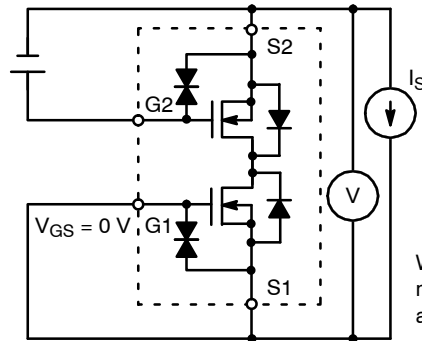


Figure 8. Test Circuit 8 - $V_{F(s-s)}$

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

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

TYPICAL CHARACTERISTICS

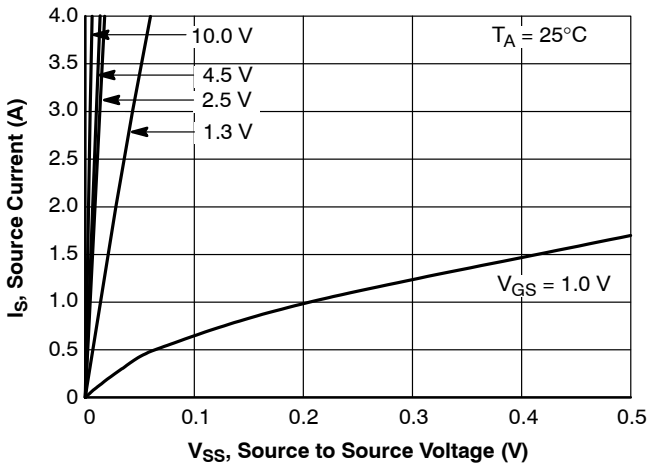


Figure 9. $I_S - V_{SS}$

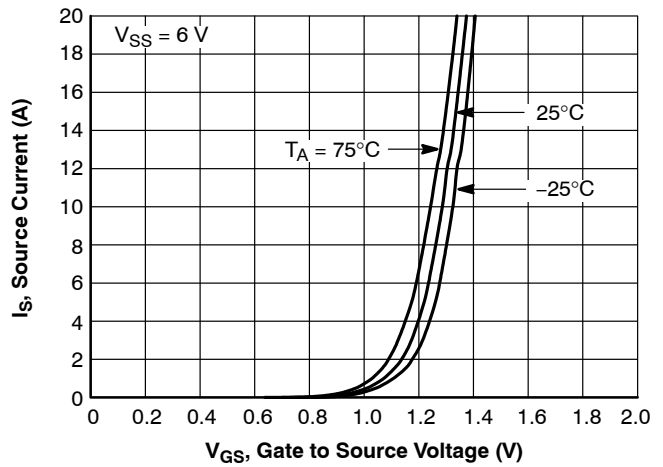


Figure 10. $I_S - V_{GS}$

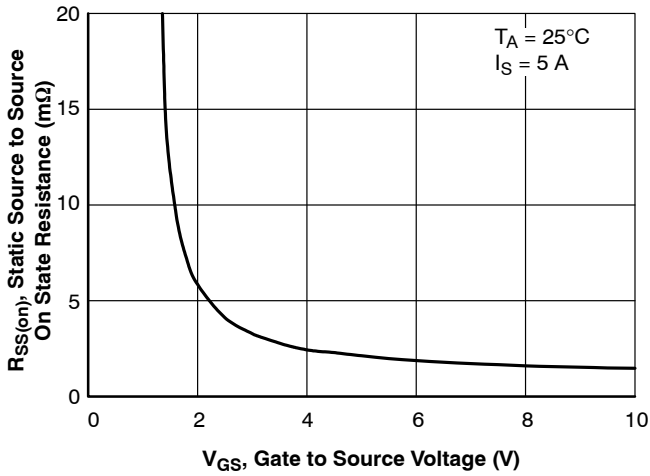


Figure 11. $R_{SS(on)} - V_{GS}$

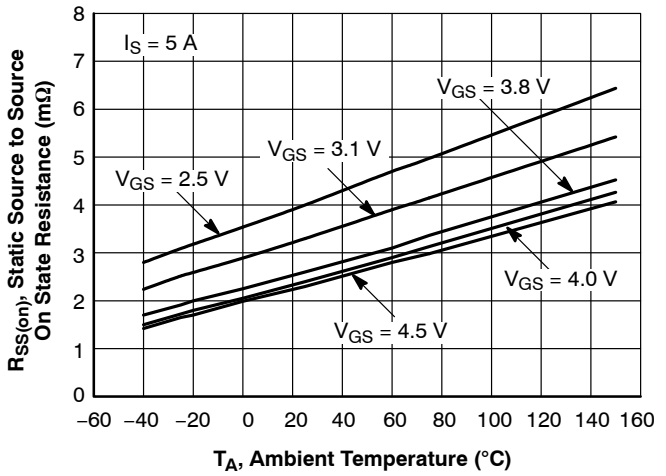


Figure 12. $R_{SS(on)} - T_A$

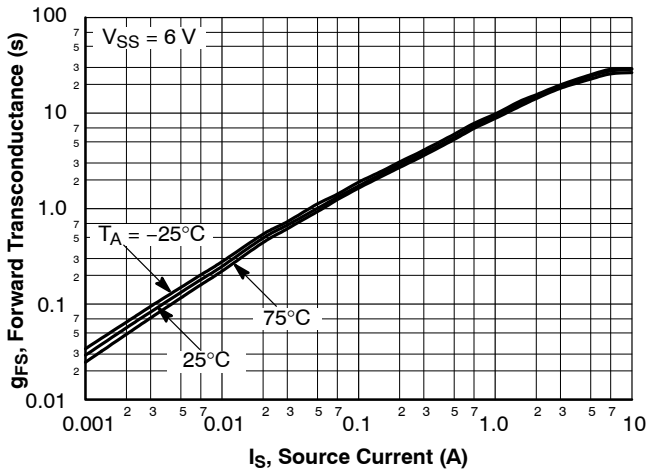


Figure 13. $g_{FS} - I_S$

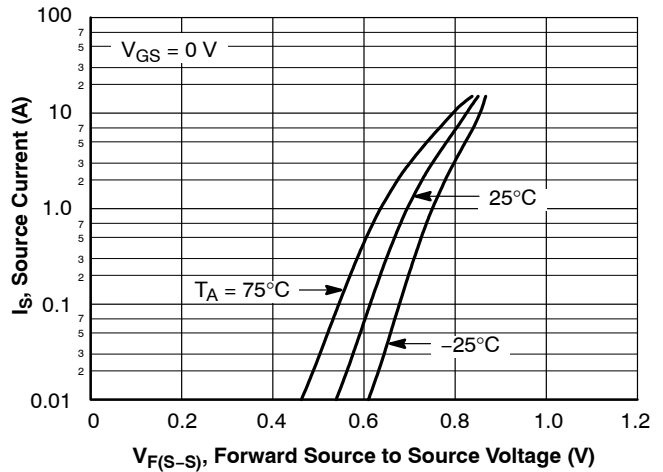


Figure 14. $I_S - V_{F(S-S)}$

TYPICAL CHARACTERISTICS (Continued)

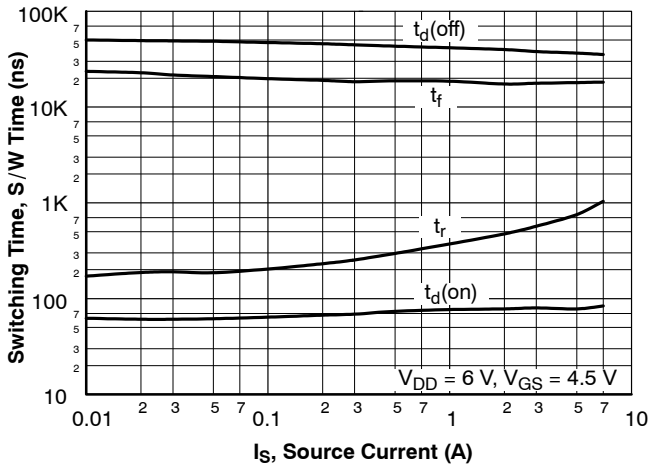


Figure 15. S/W Time - I_S

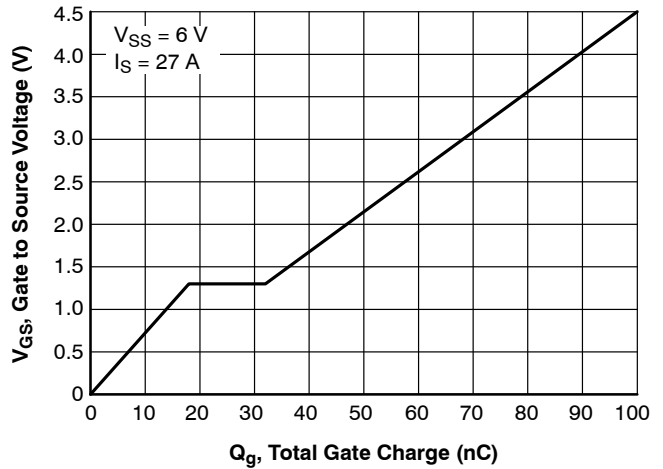


Figure 16. V_{GS} - Q_g

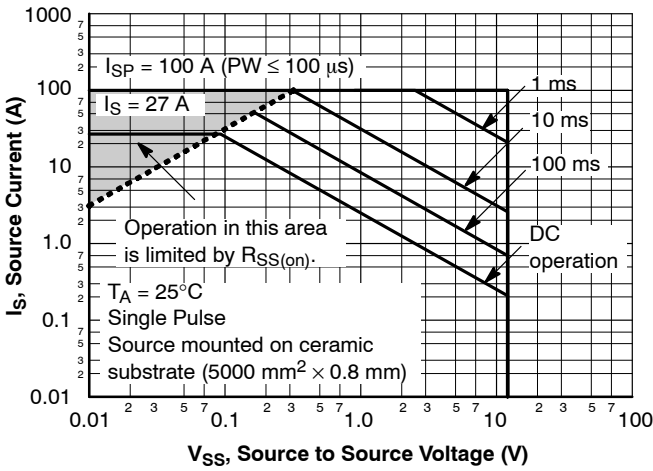


Figure 17. SOA

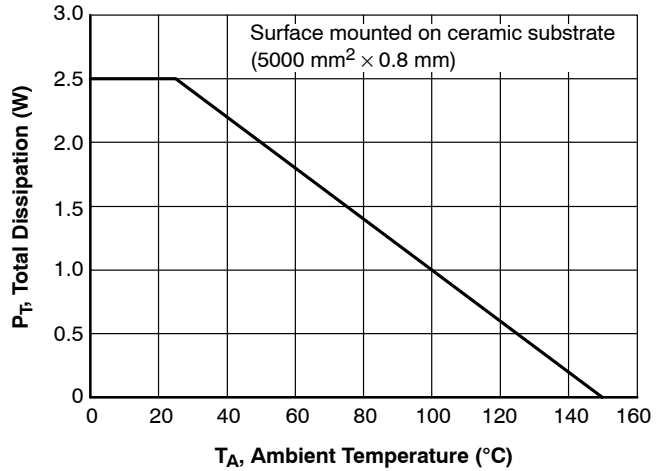


Figure 18. P_T - T_A

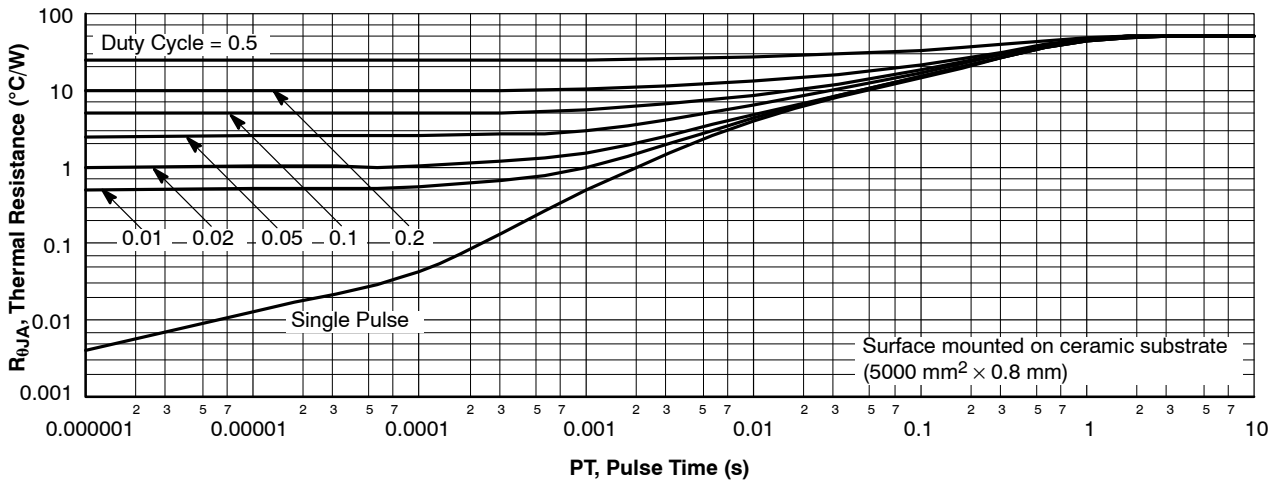


Figure 19. $R_{\theta JA}$ - Pulse Time

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

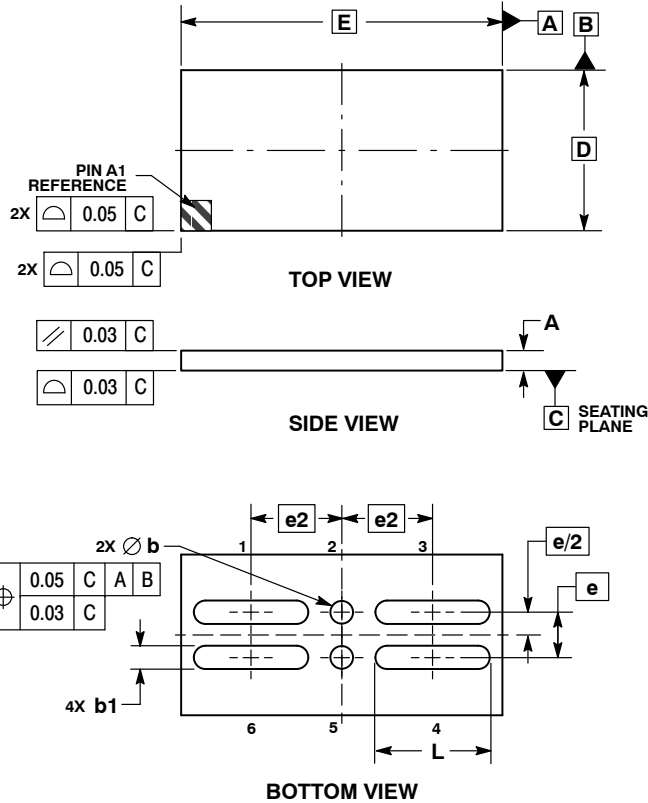
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SCALE 4:1

CSP6, 1.77x3.54 / EFCP3517-6DGH-020
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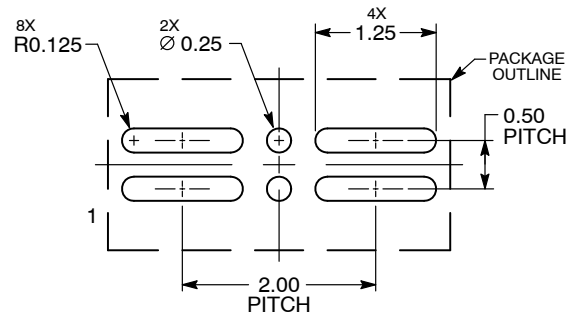
DATE 23 OCT 2013



- 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*



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.

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