

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 _{SS}	12	V
Gate to Source Voltage	V _{GS}	±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

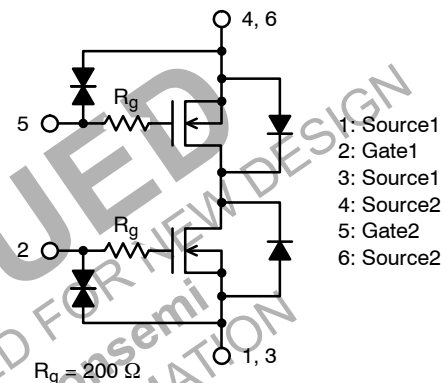
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

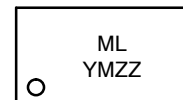
V _{SS}	R _{SS(on)} MAX	I _S MAX
12 V	3.2 mΩ @ 4.5 V	27 A
	3.2 mΩ @ 4.0 V	
	3.2 mΩ @ 3.8 V	
	4.4 mΩ @ 3.1 V	
	6.3 mΩ @ 2.5 V	

ELECTRICAL CONNECTION N-Channel



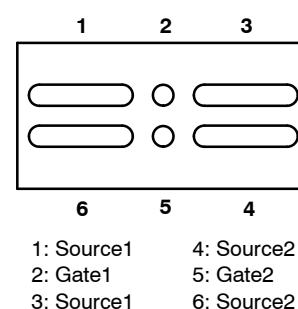
CSP6, 1.77x3.54/
EFCP3517-6DGH-020
CASE 568AL

MARKING DIAGRAM



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

PIN CONNECTIONS



ORDERING INFORMATION

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

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{SS} = 6\text{ V}$, $I_S = 1\text{ mA}$ (Test Circuit 3)	0.5	–	1.3	V
Forward Transconductance	g_{FS}	$V_{SS} = 6\text{ V}$, $I_S = 3\text{ A}$ (Test Circuit 4)	–	19	–	S
Static Source to Source On–State Resistance	$R_{SS(on)1}$	$I_S = 5\text{ A}$, $V_{GS} = 4.5\text{ V}$ (Test Circuit 5)	1.8	2.3	3.2	$\text{m}\Omega$
	$R_{SS(on)2}$	$I_S = 5\text{ A}$, $V_{GS} = 4.0\text{ V}$ (Test Circuit 5)	1.9	2.4	3.2	$\text{m}\Omega$
	$R_{SS(on)3}$	$I_S = 5\text{ A}$, $V_{GS} = 3.8\text{ V}$ (Test Circuit 5)	2.0	2.6	3.2	$\text{m}\Omega$
	$R_{SS(on)4}$	$I_S = 5\text{ A}$, $V_{GS} = 3.1\text{ V}$ (Test Circuit 5)	2.1	3.3	4.4	$\text{m}\Omega$
	$R_{SS(on)5}$	$I_S = 5\text{ A}$, $V_{GS} = 2.5\text{ V}$ (Test Circuit 5)	2.7	4.0	6.3	$\text{m}\Omega$
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)	–	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	$V_{SS} = 6\text{ V}$, $V_{GS} = 4.5\text{ V}$, $I_S = 27\text{ A}$ (Test Circuit 7)	–	100	–	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

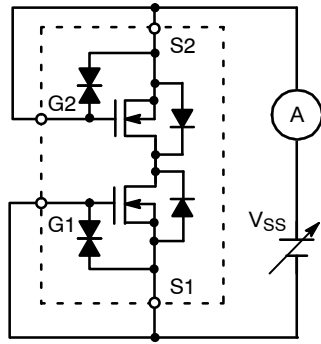
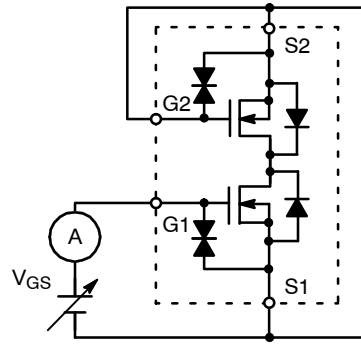
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

ORDERING INFORMATION

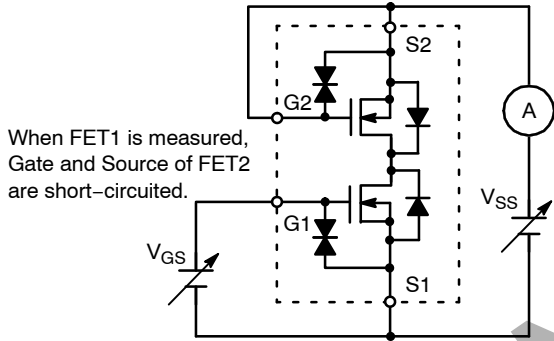
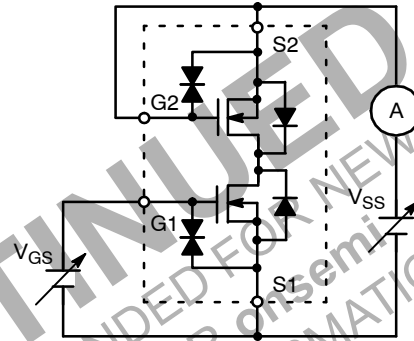
Device	Marking	Package	Shipping (Qty / Packing) [†]
EFC8811R–TF	ML	CSP6, 1.77 × 3.54 EFCP3517–6DGH–020 (Pb–Free / Halogen Free)	5,000 / Tape & Reel

[†]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](#).

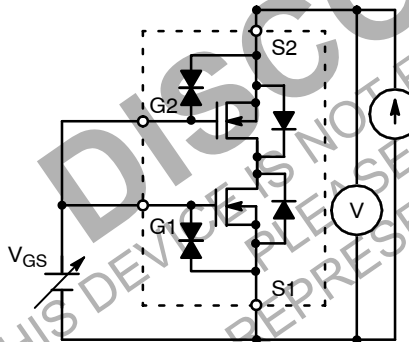
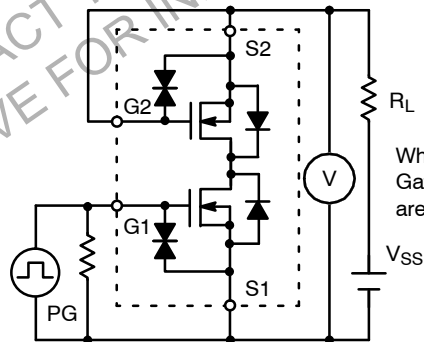
TEST CIRCUITS ARE EXAMPLE OF MEASURING FET1 SIDE

Figure 1. Test Circuit 1 - V_{SS}/I_{SS} Figure 2. Test Circuit 2 - I_{GSS}

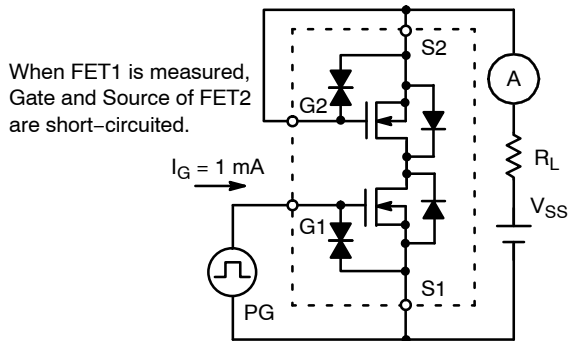
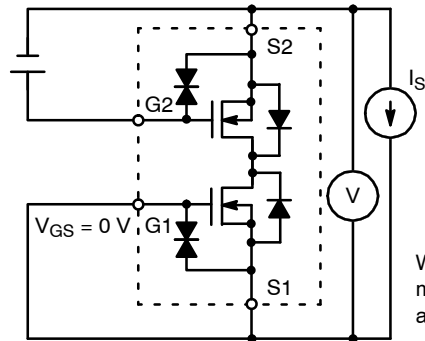
When FET1 is measured,
Gate and Source of FET2
are short-circuited.

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

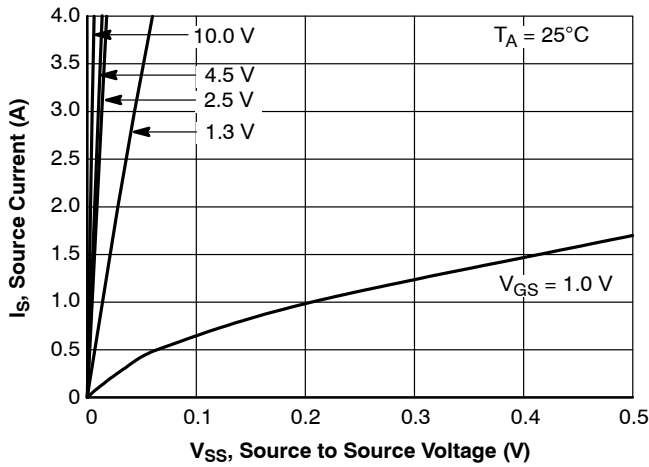
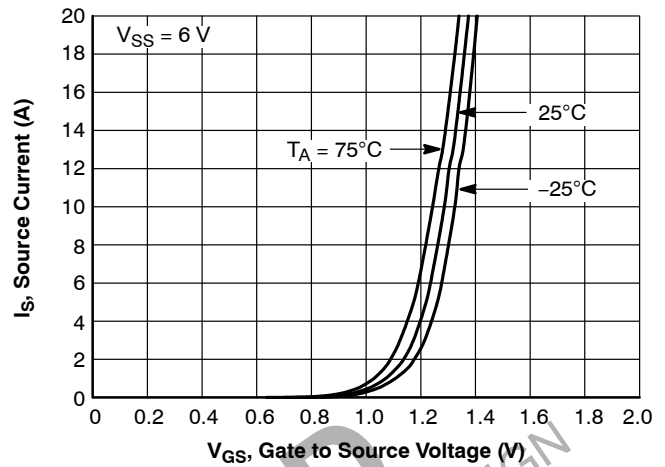
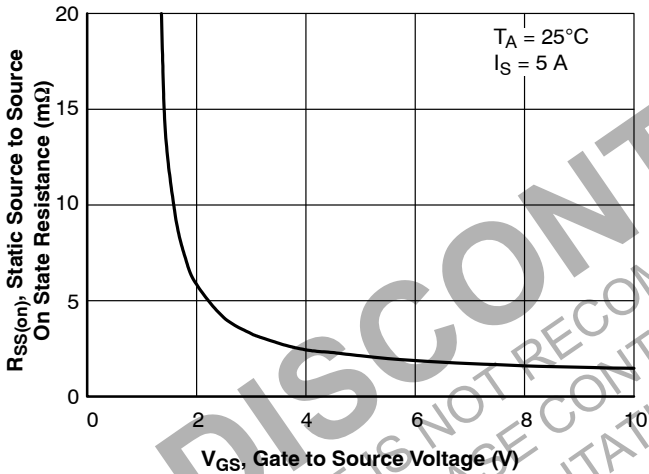
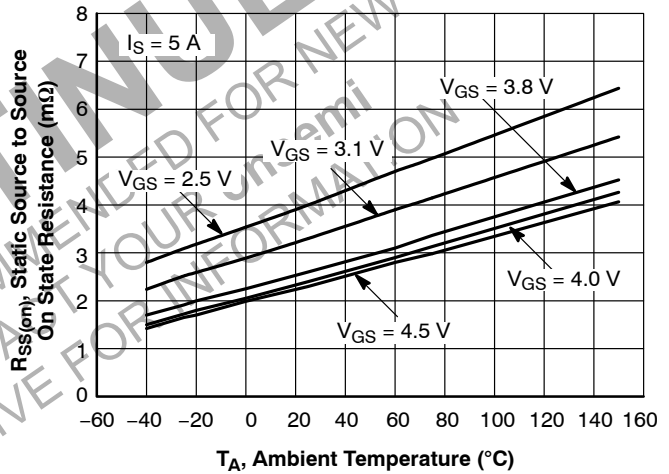
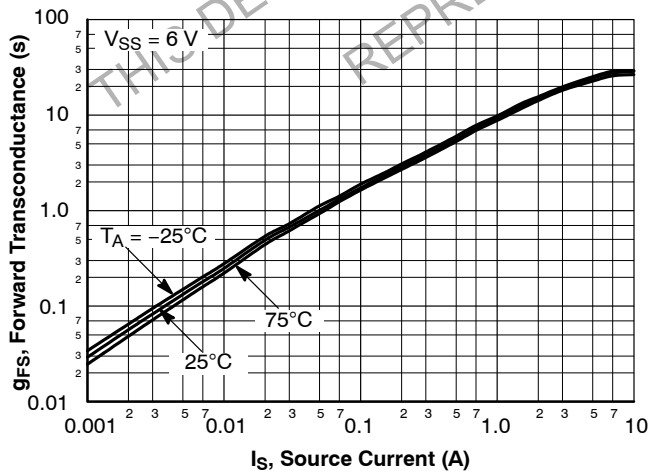
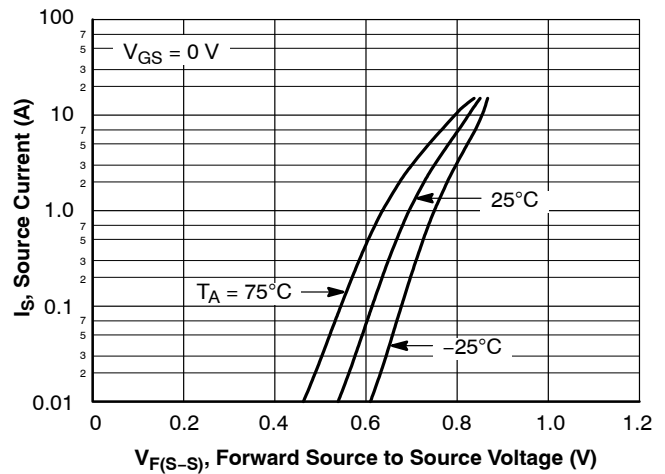
When FET1 is measured,
Gate and Source of FET2
are short-circuited.

Figure 7. Test Circuit 7 - Q_g 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)

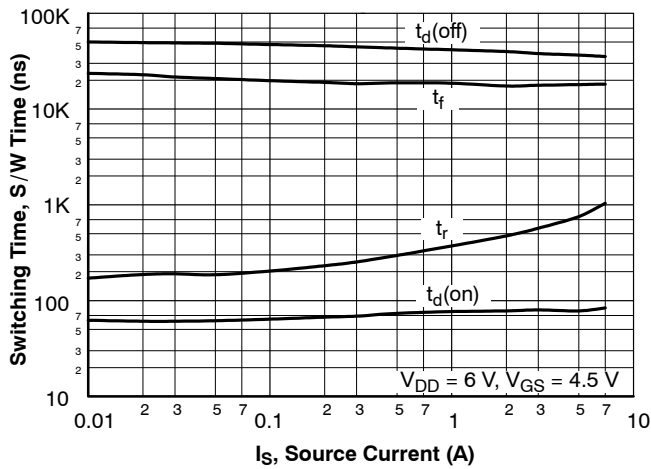
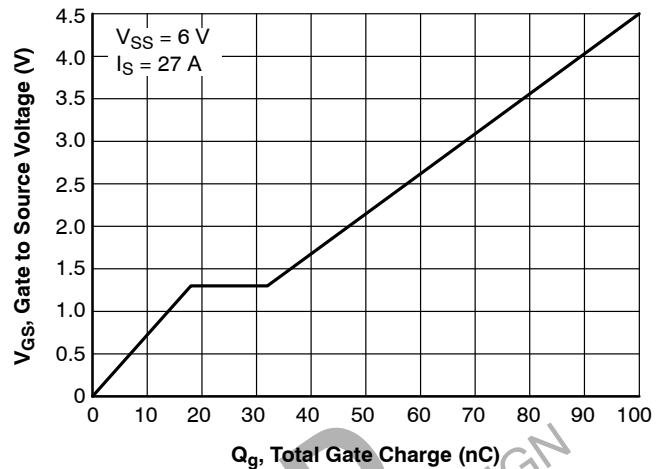
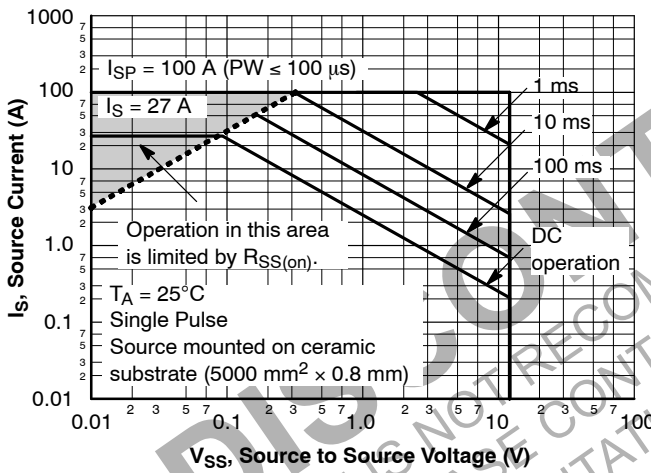
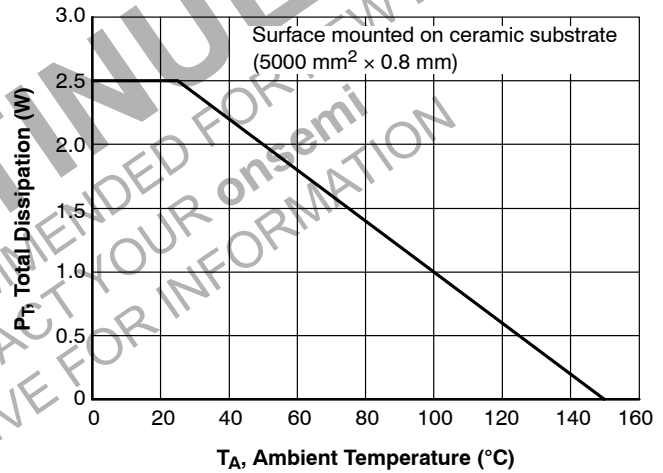
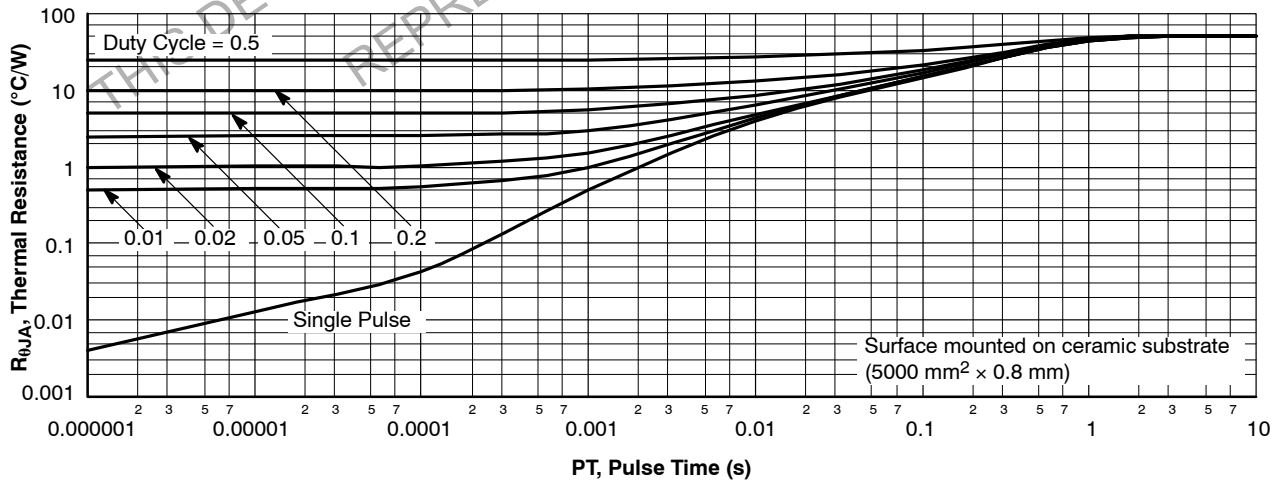
Figure 15. S/W Time – I_S Figure 16. V_{GS} – Q_g 

Figure 17. SOA

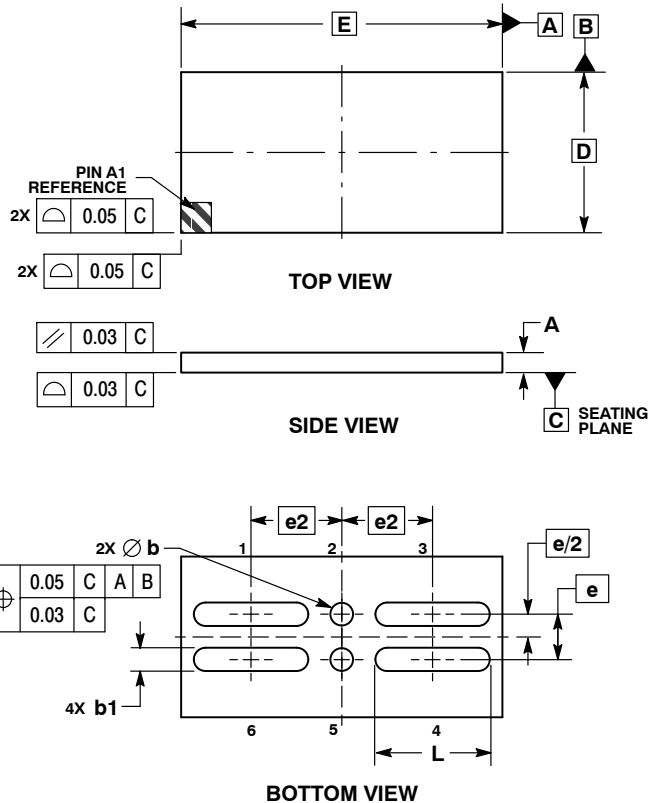
Figure 18. P_T – T_A Figure 19. $R_{\theta JA}$ – Pulse Time



SCALE 4:1

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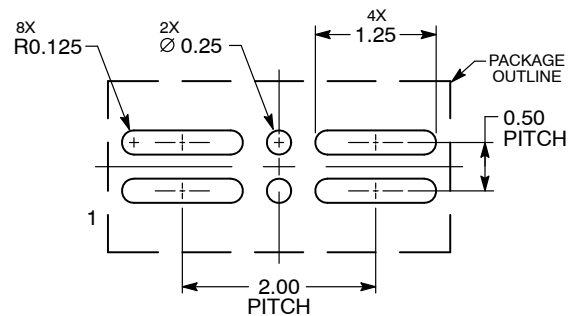
DATE 23 OCT 2013



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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