MOSFET – Power, Dual, N-Channel, For 1-2 Cells Lithium-ion Battery Protection

24 V, 11.6 mΩ, 10 A,

ECH8697R

V_{DSS}	$R_{DS(on)}$ Max	I_D Max
24 V	11.6 mΩ @ 4.5 V	10 A
	12.6 mΩ @ 4.0 V	
	15 mΩ @ 3.1 V	
	17.5 mΩ @ 2.5 V	

Description

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 1−2 cells Lithium−ion Battery applications.

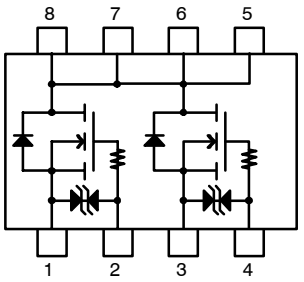
Features

- Low On−Resistance
- 2.5 V Drive
- Common−Drain Type
- ESD Diode−Protected Gate
- Built−in Gate Protection Resistor
- These Devices are Pb−Free and are RoHS Compliant

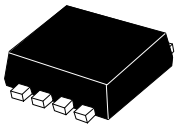
Typical Applications

- 1−2 cells Lithium−ion Battery Charging and Discharging Switch

ELECTRICAL CONNECTION
N−Channel



1 : Source1
2 : Gate1
3 : Source2
4 : Gate2
5 : Drain
6 : Drain
7 : Drain
8 : Drain



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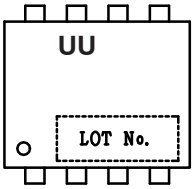
MARKING DIAGRAM



ORDERING INFORMATION

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

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain to Source Voltage	24	V
V_{GSS}	Gate to Source Voltage	±12.5	V
I_D	Drain Current (DC)	10	A
I_{DP}	Drain Current (Pulse) PW ≤ 10 μs, duty cycle ≤ 1%	60	A
P_D	Power Dissipation Surface mounted on ceramic substrate (1000 mm^2 x 0.8 mm) 1 unit	1.5	W
P_T	Total Dissipation Surface mounted on ceramic substrate (1000 mm^2 x 0.8 mm)	1.6	W
Tj	Junction Temperature	150	°C
Tstg	Storage Temperature	−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 CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Junction to Ambient Surface mounted on ceramic substrate (1000 mm^2 x 0.8 mm) 1 unit	83.3	°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Symbol	Parameter	Conditions	Value			Unit
			Min	Typ	Max	
$V_{(BR)DSS}$	Drain to Source Breakdown Voltage	I_D = 1 mA, V_{GS} = 0 V	24	–	–	V
I_{DSS}	Zero−Gate Voltage Drain Current	V_{DS} = 20 V, V_{GS} = 0 V	–	–	1	μA
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±8 V, V_{DS} = 0 V	–	–	±1	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = 10 V, I_D = 1 mA	0.5	–	1.3	V
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 5 A	–	5.0	–	S
$R_{DS(on)}$	Static Drain to Source On−State Resistance	I_D = 5 A, V_{GS} = 4.5 V	7.4	9.3	11.6	mΩ
		I_D = 5 A, V_{GS} = 4.0 V	7.7	9.7	12.6	mΩ
		I_D = 5 A, V_{GS} = 3.1 V	8.5	10.7	15	mΩ
		I_D = 2.5 A, V_{GS} = 2.5 V	10	12.5	17.5	mΩ
$t_{d(on)}$	Turn−ON Delay Time	See Figure 1 (Note 1)	–	160	–	ns
t_r	Rise Time		–	230	–	ns
$t_{d(off)}$	Turn−OFF Delay Time		–	19.7	–	μs
t_f	Fall Time		–	23.6	–	μs
$t_{d(on)}$	Turn−ON Delay Time	See Figure 2 (Note 1)	–	160	–	ns
t_r	Rise Time		–	230	–	ns
$t_{d(off)}$	Turn−OFF Delay Time		–	980	–	μs
t_f	Fall Time		–	350	–	μs
Qg	Total Gate Charge		–	6	–	nC
Qgs	Gate to Source Charge	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 10 A	–	1.1	–	nC
Qgd	Gate to Drain “Miller” Charge		–	0.9	–	nC
V_{SD}	Forward Diode Voltage	I_S = 10 A, V_{GS} = 0 V	–	0.8	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.

1. The fall switching time is dependent on the input pulse width.

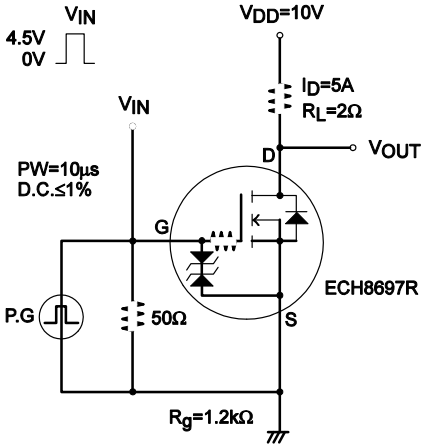


Figure 1. Switching Time Test Circuit 1

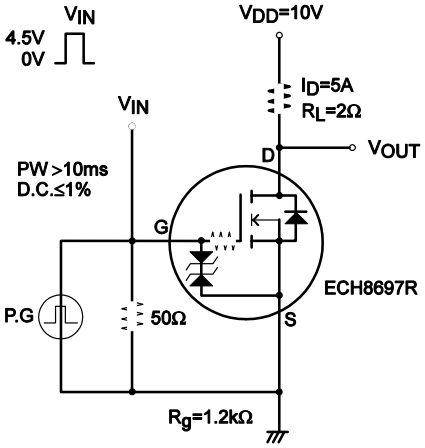


Figure 2. Switching Time Test Circuit 2

TYPICAL CHARACTERISTICS

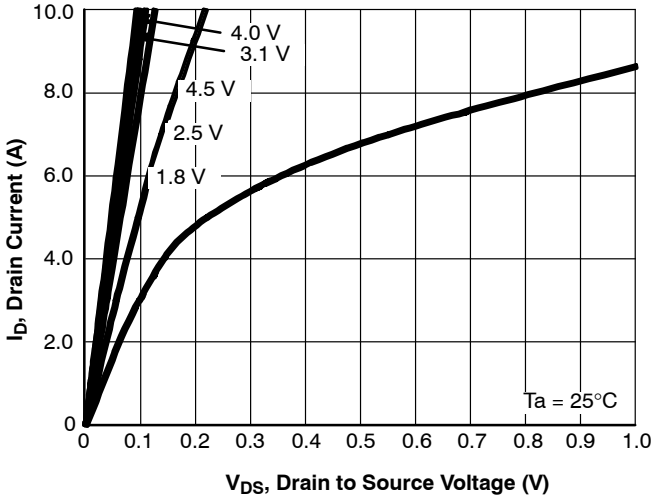


Figure 3. $I_D - V_{DS}$

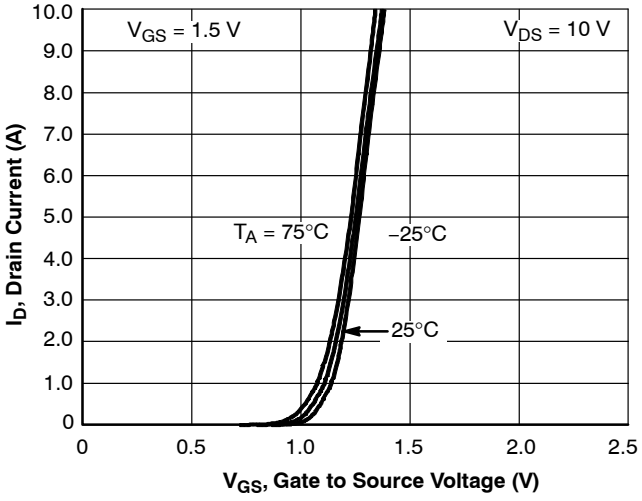


Figure 4. $I_D - V_{GS}$

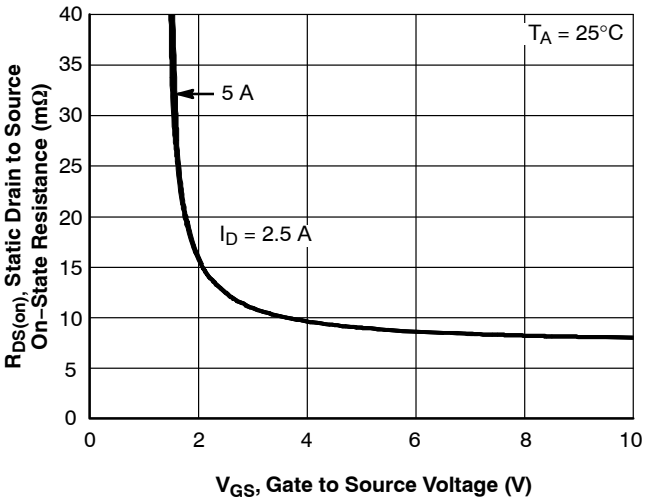


Figure 5. $R_{DS(on)} - V_{GS}$

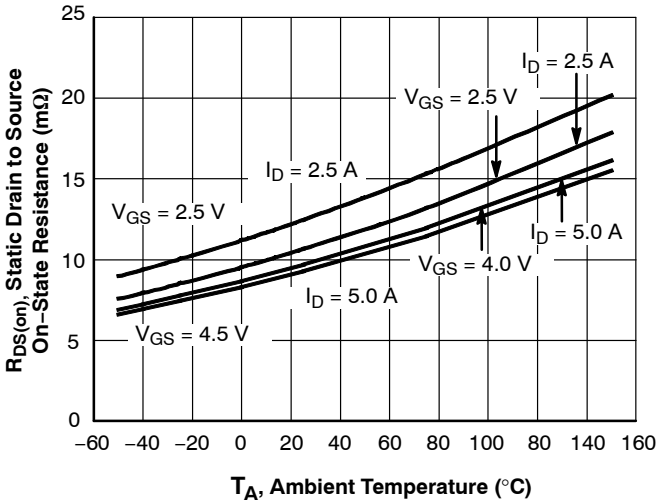


Figure 6. $R_{DS(on)} - T_A$

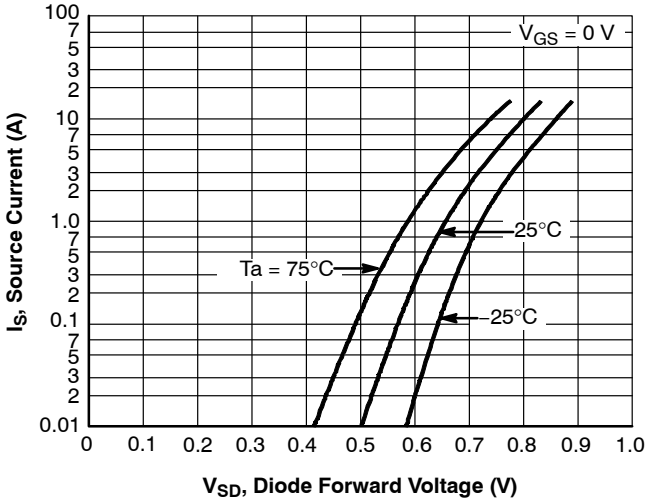


Figure 7. $I_S - V_{SD}$

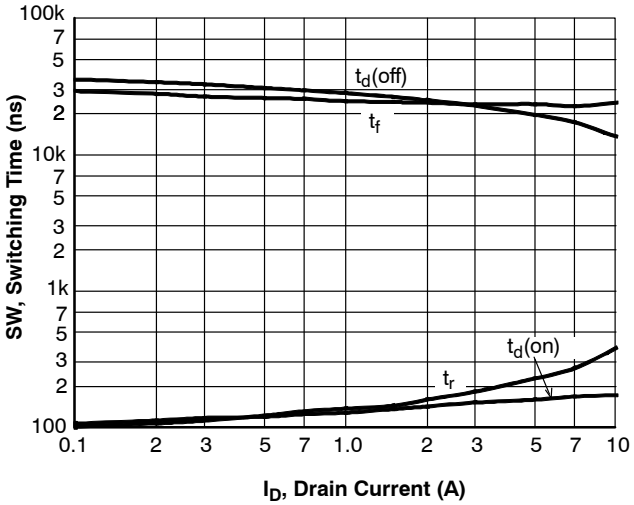


Figure 8. I_D − S/W Time

TYPICAL CHARACTERISTICS (CONTINUED)

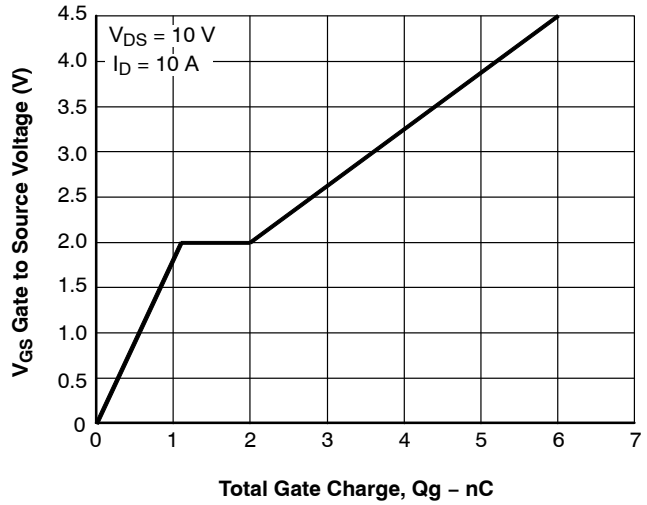


Figure 9. V_{GS} – Q_g

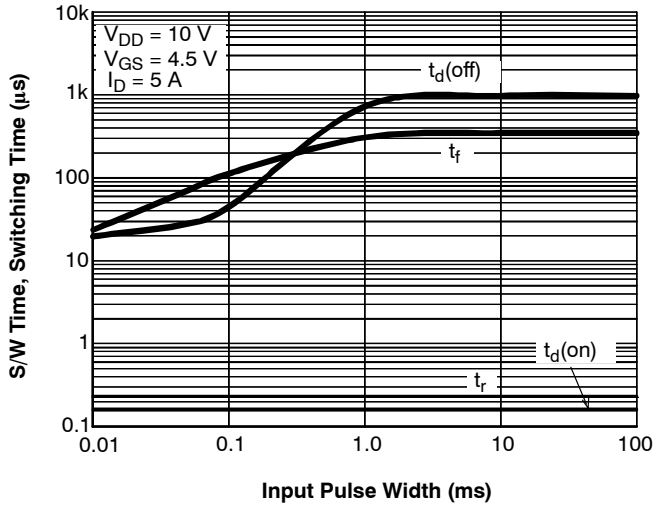


Figure 10. S/W Time – Input Pulse Width

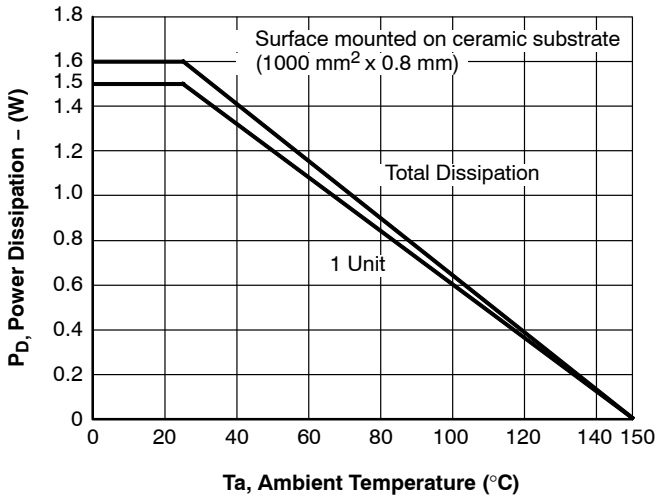


Figure 11. P_D – Ta

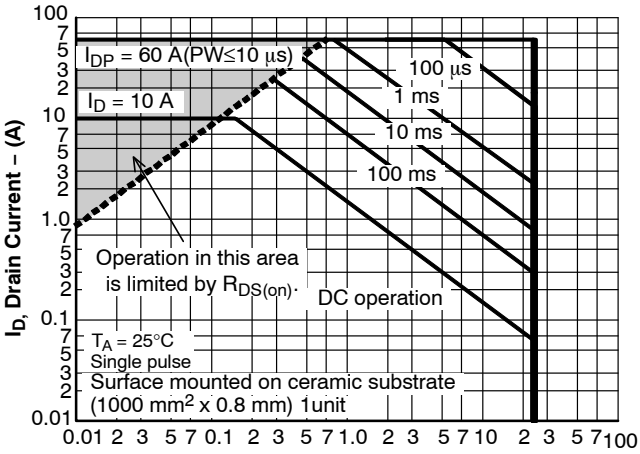


Figure 12. S O A

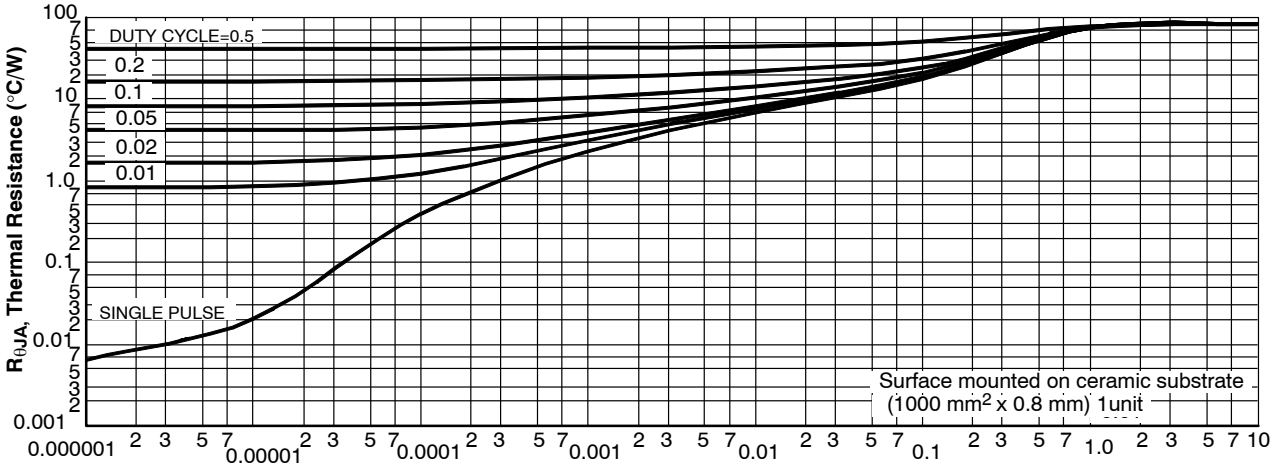


Figure 13. $R_{\theta JA}$ – Pulse Time

ORDERING INFORMATION

Product Number	Package	Shipping†
ECH8697R−TL−W	SOT−28FL, / ECH8 (Pb−Free / Halogen Free)	3000 / Tape and 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.

Note on usage : Since the ECH8697R is a MOSFET product, please avoid using this device in the vicinity of highly charged objects. Please contact sales for use except the designated application.

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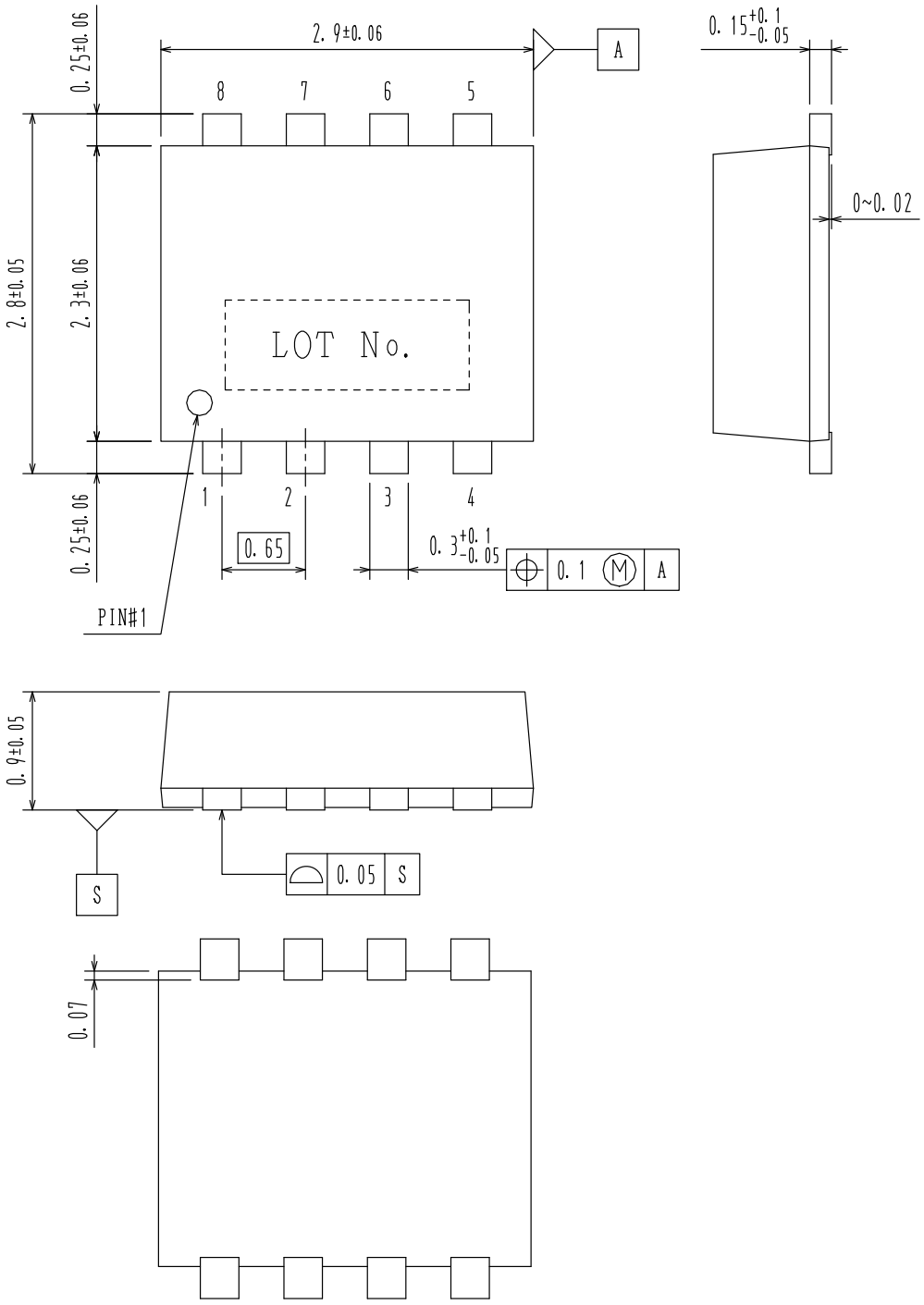

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