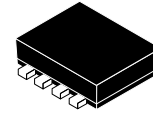


# N-Channel Power MOSFET

24 V, 9 A, 16 mΩ, Dual ECH8

## ECH8655R-R-TL-H



SOT-28FL / ECH8  
CASE 318BF

### Features

- Low ON-resistance
- 2.5 V Drive
- Common-drain Type
- Protection Diode in
- Built-in Gate Protection Resistor
- Best Suited for LiB Charging and Discharging Switch
- This Device is Pb-Free and are RoHS Compliant

### Product & Package Information

- Package: ECH8
- JEITA, JEDEC: –
- Minimum Packing Quantity: 3,000 Pcs./Reel

Unit : mm (typ)  
7011A-003

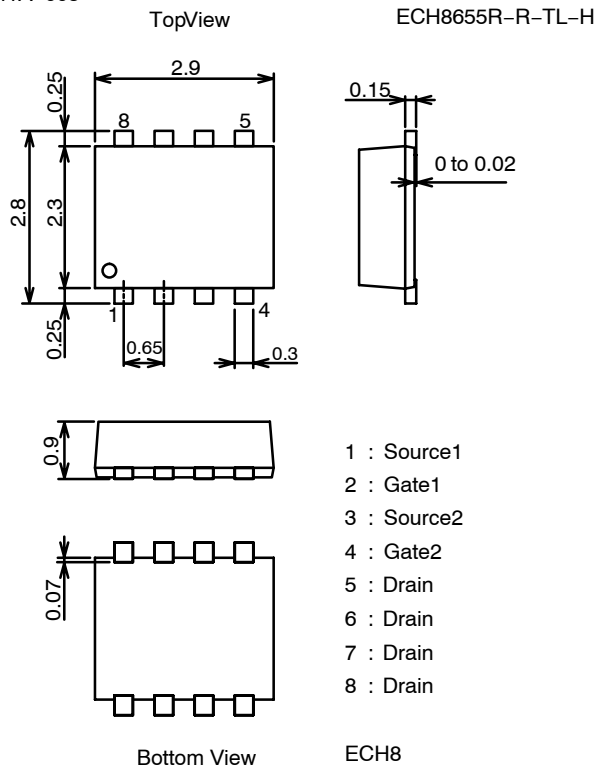
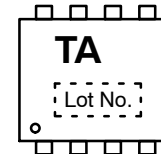
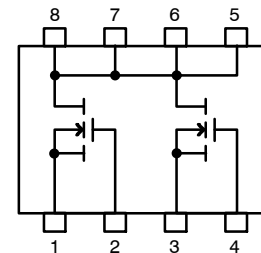


Figure 1. Package Dimensions

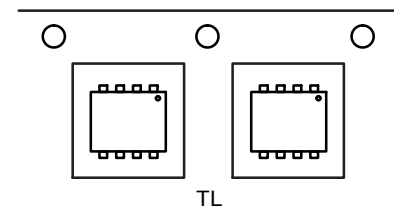
### GENERIC MARKING DIAGRAM



### ELECTRICAL CONNECTION



### PACKING TYPE: TL



### ORDERING INFORMATION

See detailed ordering and shipping information on page 3 of this data sheet.

## SPECIFICATIONS

ABSOLUTE MAXIMUM RATINGS at  $T_A = 25^{\circ}\text{C}$ 

Parameter	Symbol	Conditions	Ratings	Unit
Drain-to-Source Voltage	$V_{\text{DSS}}$		24	V
Gate-to-Source Voltage	$V_{\text{GSS}}$		$\pm 12$	V
Drain Current (DC)	$I_{\text{D}}$		9	A
Drain Current (Pulse)	$I_{\text{DP}}$	$PW \leq 10 \mu\text{s}$ , duty cycle $\leq 1\%$	60	A
Allowable Power Dissipation	$P_{\text{D}}$	When mounted on ceramic substrate ( $900 \text{ mm}^2 \times 0.8 \text{ mm}$ ) 1 unit	1.4	W
Total Dissipation	$P_{\text{T}}$	When mounted on ceramic substrate ( $900 \text{ mm}^2 \times 0.8 \text{ mm}$ )	1.5	W
Channel Temperature	$T_{\text{ch}}$		150	$^{\circ}\text{C}$
Storage Temperature	$T_{\text{stg}}$		$-55$ to $+150$	$^{\circ}\text{C}$

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.

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

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$I_{\text{D}} = 1 \text{ mA}$ , $V_{\text{GS}} = 0 \text{ V}$	24			V
Zero-Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{DS}} = 20 \text{ V}$ , $V_{\text{GS}} = 0 \text{ V}$			1	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{\text{GSS}}$	$V_{\text{GS}} = \pm 8 \text{ V}$ , $V_{\text{DS}} = 0 \text{ V}$			$\pm 10$	$\mu\text{A}$
Cutoff Voltage	$V_{\text{GS(off)}}$	$V_{\text{DS}} = 10 \text{ V}$ , $I_{\text{D}} = 1 \text{ mA}$	0.5		1.3	V
Forward Transfer Admittance	$ y_{\text{fs}} $	$V_{\text{DS}} = 10 \text{ V}$ , $I_{\text{D}} = 4.5 \text{ A}$	4.8	8		S
Static Drain-to-Source On-State Resistance	$R_{\text{DS(on)1}}$	$I_{\text{D}} = 4.5 \text{ A}$ , $V_{\text{GS}} = 4.5 \text{ V}$	10	13	16	$\text{m}\Omega$
	$R_{\text{DS(on)2}}$	$I_{\text{D}} = 4.5 \text{ A}$ , $V_{\text{GS}} = 4.0 \text{ V}$	10.5	13.5	16.5	$\text{m}\Omega$
	$R_{\text{DS(on)3}}$	$I_{\text{D}} = 4.5 \text{ A}$ , $V_{\text{GS}} = 3.1 \text{ V}$	11	15	20	$\text{m}\Omega$
	$R_{\text{DS(on)4}}$	$I_{\text{D}} = 2 \text{ A}$ , $V_{\text{GS}} = 2.5 \text{ V}$	13	18	24	$\text{m}\Omega$
Turn-ON Delay Time	$t_{\text{d(on)}}$	See specified Test Circuit.		320		ns
Rise Time	$t_{\text{r}}$			1100		ns
Turn-OFF Delay Time	$t_{\text{d(off)}}$			2400		ns
Fall Time	$t_{\text{f}}$			2100		ns
Total Gate Charge	$Q_{\text{g}}$	$V_{\text{DS}} = 10 \text{ V}$ , $V_{\text{GS}} = 10 \text{ V}$ , $I_{\text{D}} = 9 \text{ A}$		16.8		nC
Gate-to-Source Charge	$Q_{\text{gs}}$			1.6		nC
Gate-to-Drain "Miller" Charge	$Q_{\text{gd}}$			4.8		nC
Diode Forward Voltage	$V_{\text{SD}}$	$I_{\text{S}} = 9 \text{ A}$ , $V_{\text{GS}} = 0 \text{ V}$		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.

ECH8655R-R-TL-H

Switching Time Test Circuit

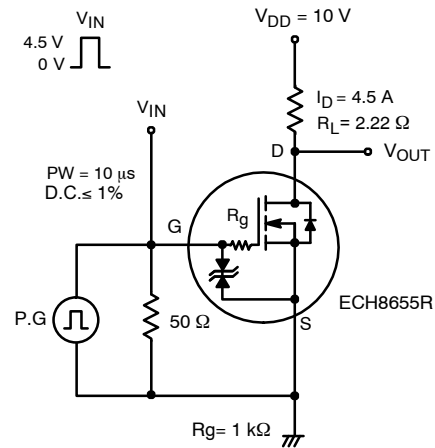


Figure 2. Switching Time Test Circuit

ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>	Memo
ECH8655R-R-TL-H	ECH8	3,000 pcs./reel	Pb Free and Halogen Free

<sup>†</sup>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.

TYPICAL CHARACTERISTICS

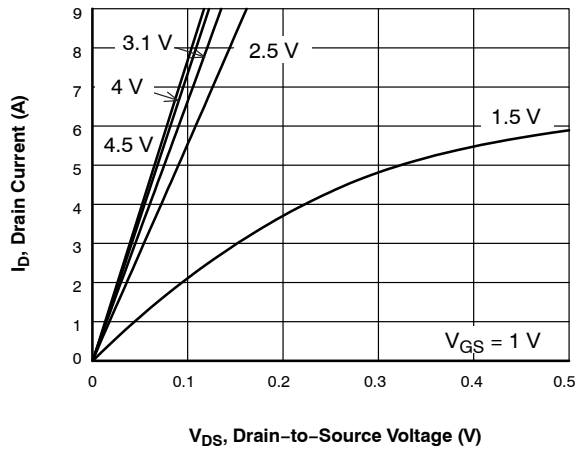


Figure 3.  $I_D - V_{DS}$

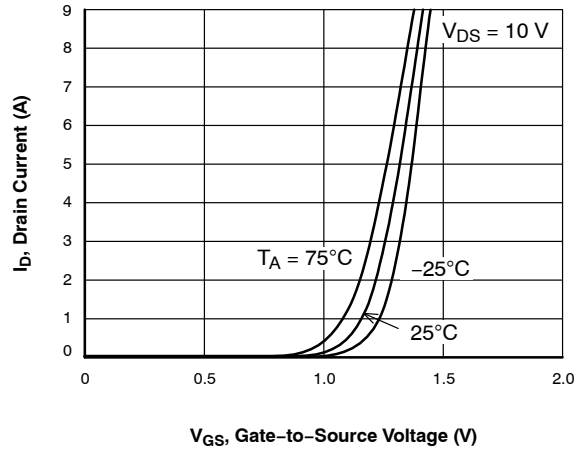


Figure 4.  $I_D - V_{GS}$

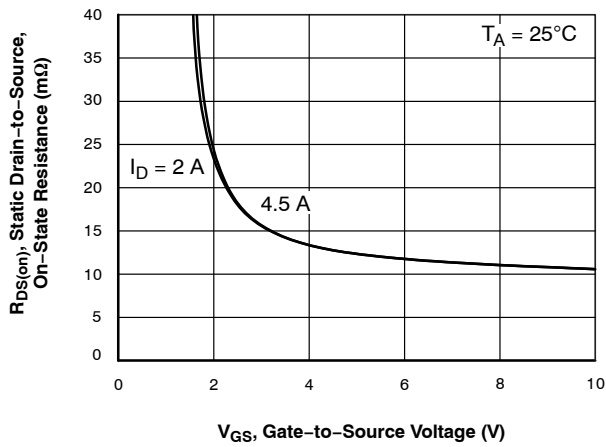


Figure 5.  $R_{DS(on)} - V_{GS}$

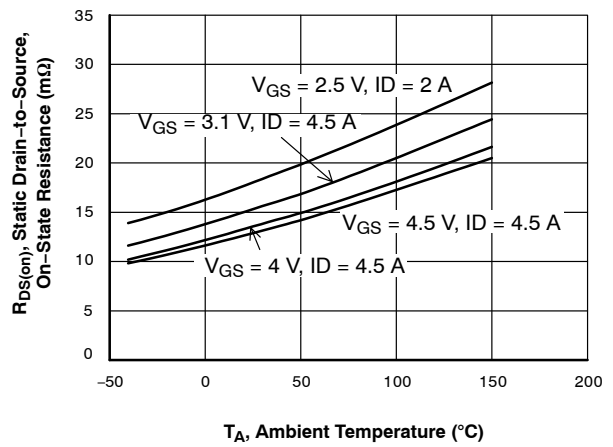


Figure 6.  $R_{DS(on)} - T_A$

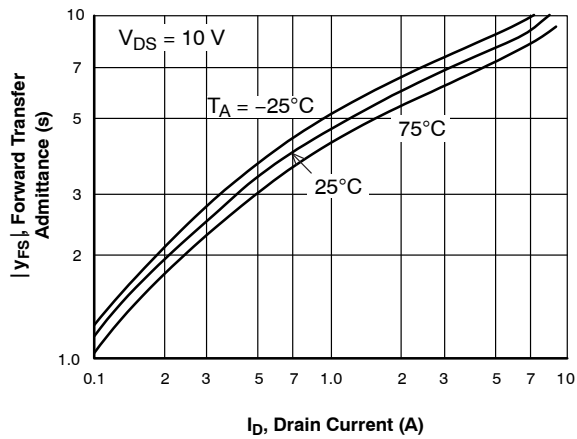


Figure 7.  $|y_{fs}| - I_D$

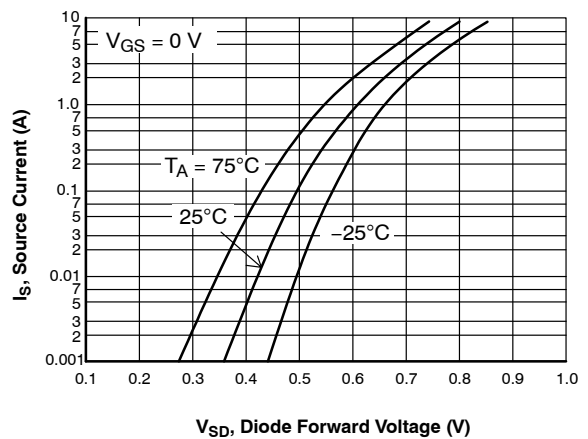


Figure 8.  $I_S - V_{SD}$

# ECH8655R-R-TL-H

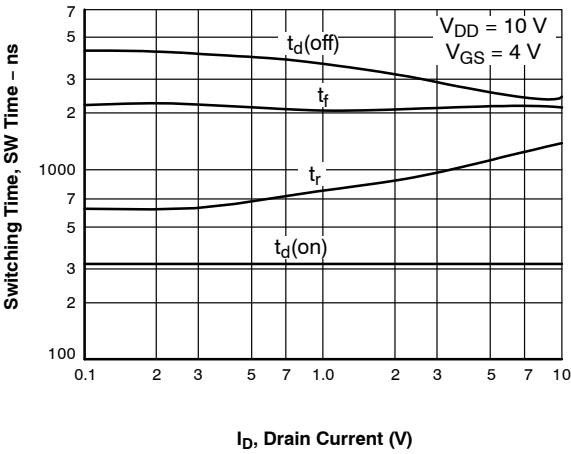


Figure 9. SW Time -  $I_D$

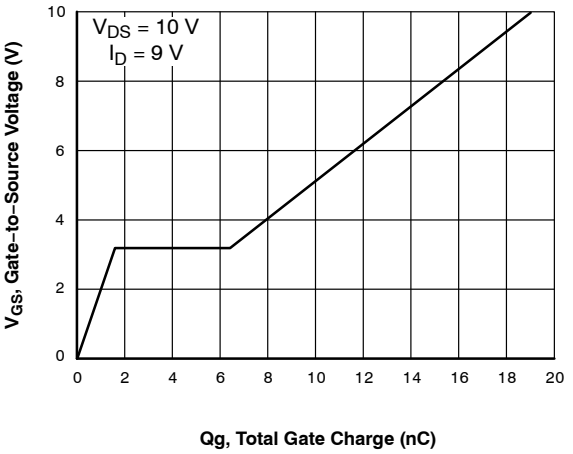


Figure 10.  $V_{GS}$  -  $Q_g$

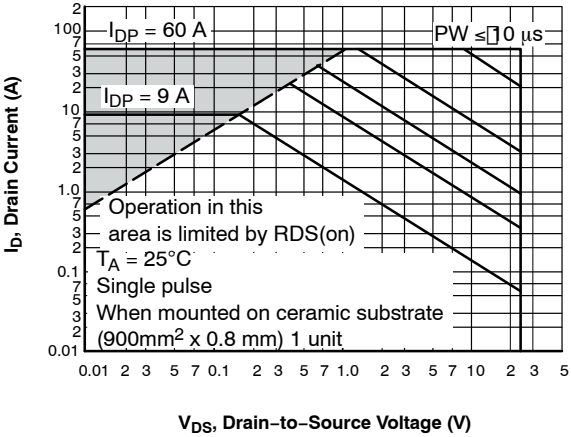


Figure 11. ASO

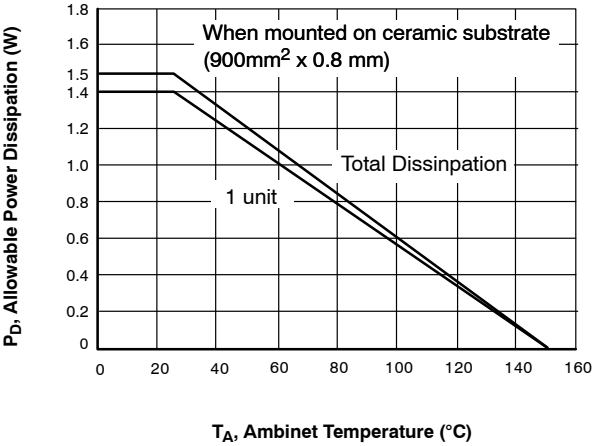
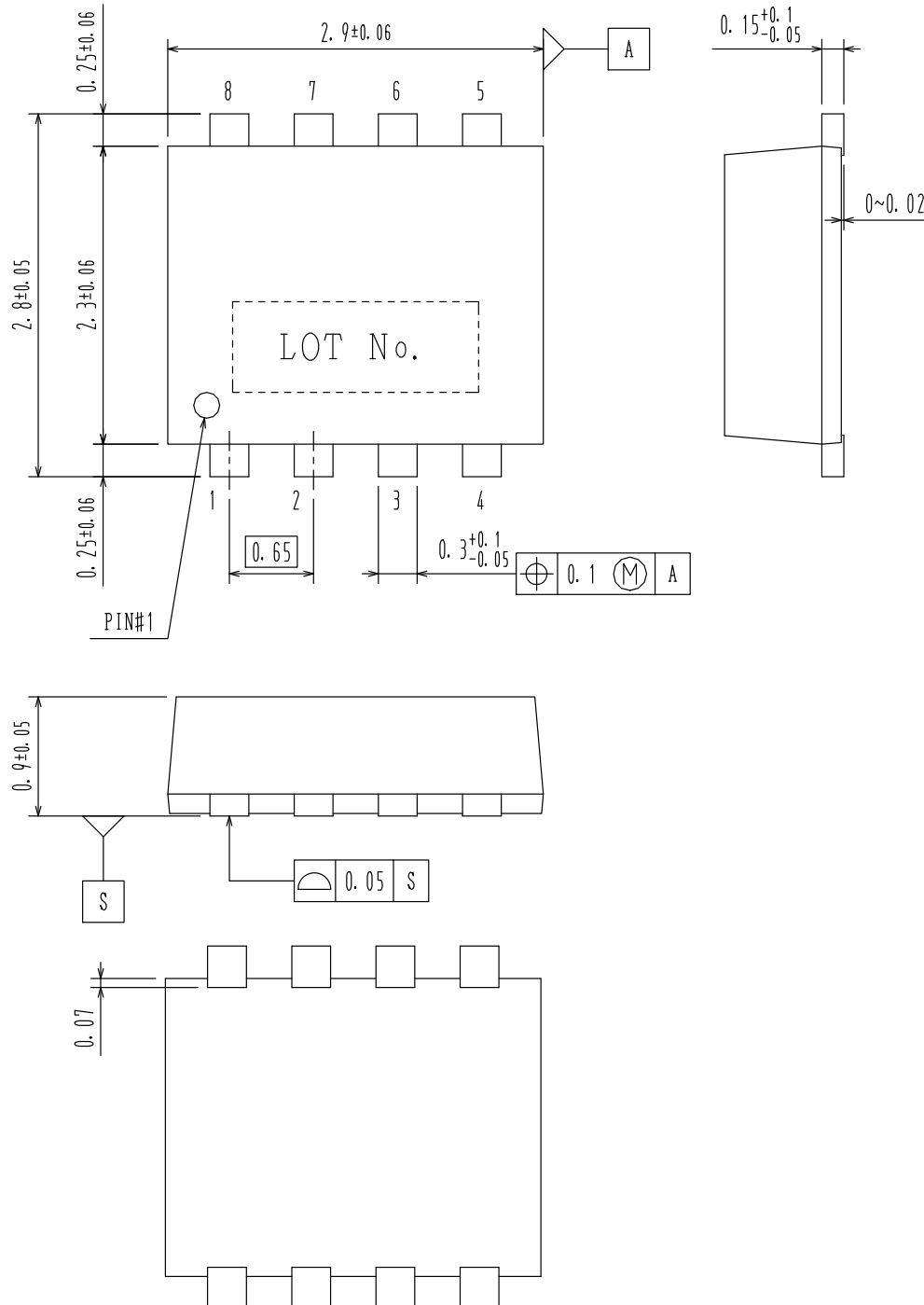


Figure 12.  $P_D$  -  $T_A$

Since the ECH8655R-R-TL-H is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

**SOT-28FL / ECH8**  
**CASE 318BF**  
**ISSUE O**

DATE 31 MAR 2012



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