

# ECH8655R-R-TL-H

## N-Channel Power MOSFET

24 V, 9 A, 16 mΩ, Dual ECH8

### 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

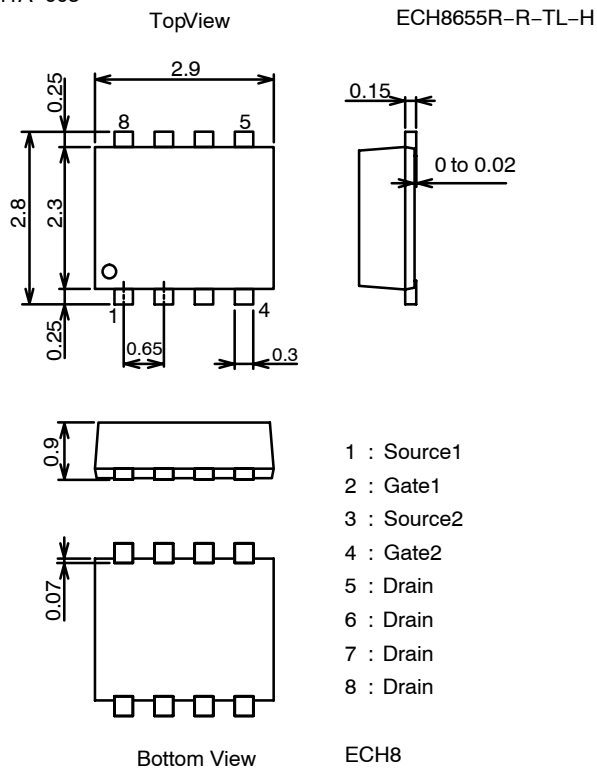
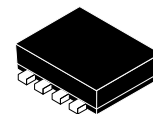


Figure 1. Package Dimensions



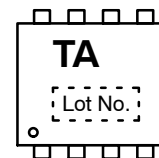
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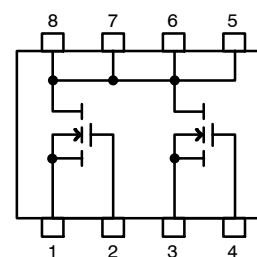


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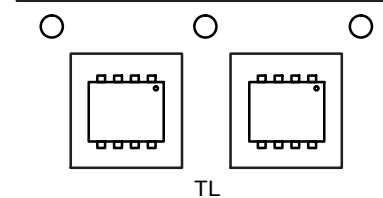
### GENERIC MARKING DIAGRAM



### ELECTRICAL CONNECTION



### PACKING TYPE: TL



### ORDERING INFORMATION

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

# ECH8655R-R-TL-H

## 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

# ECH8655R-R-TL-H

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

Parameter	Symbol	Conditions	Ratings			Unit
			Min	Typ	Max	
Total Gate Charge	Qg	$V_{DS} = 10\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 9\text{ A}$		16.8		nC
Gate-to-Source Charge	Qgs			1.6		nC
Gate-to-Drain "Miller" Charge	Qgd			4.8		nC
Diode Forward Voltage	$V_{SD}$	$I_S = 9\text{ A}$ , $V_{GS} = 0\text{ V}$		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.

## Switching Time Test Circuit

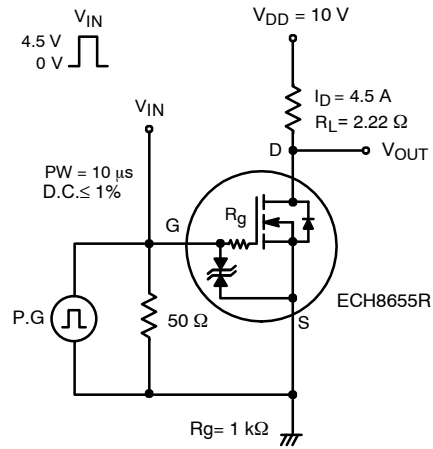


Figure 2. Switching Time Test Circuit

## ORDERING INFORMATION

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

TYPICAL CHARACTERISTICS

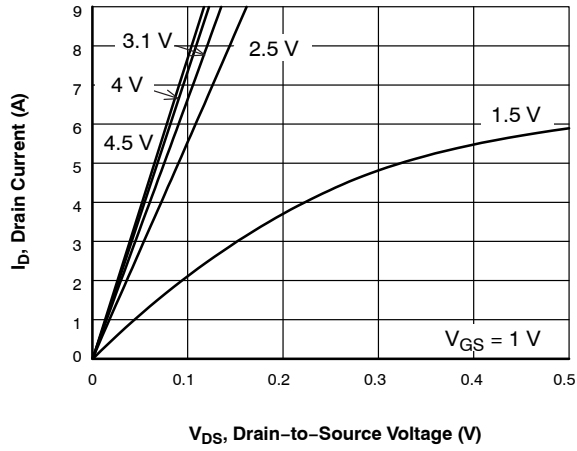


Figure 3.  $I_D - V_{DS}$

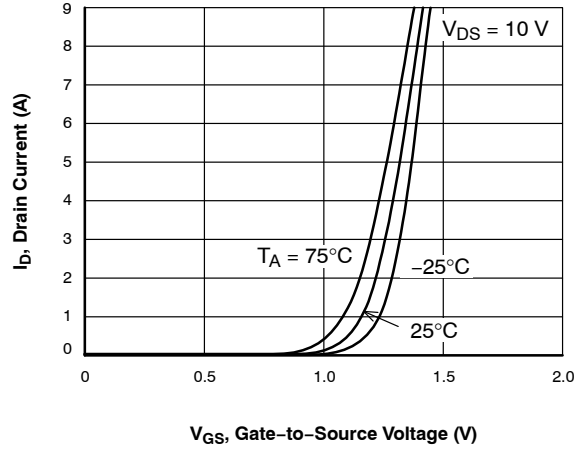


Figure 4.  $I_D - V_{GS}$

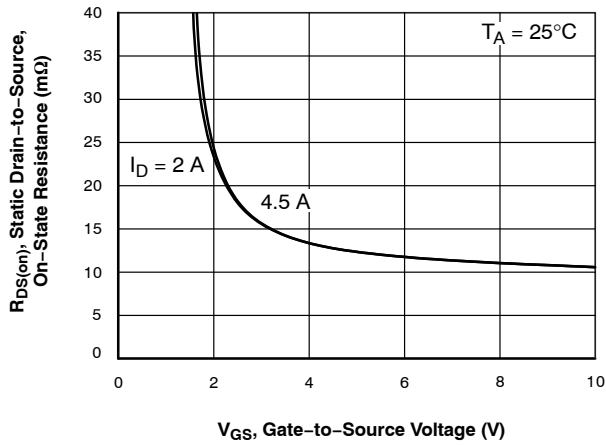


Figure 5.  $R_{DS(on)} - V_{GS}$

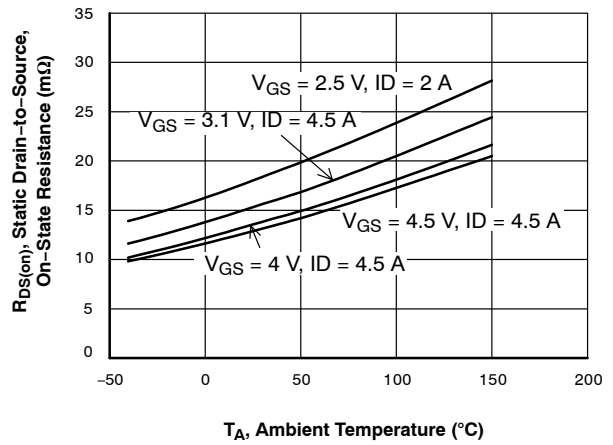


Figure 6.  $R_{DS(on)} - T_A$

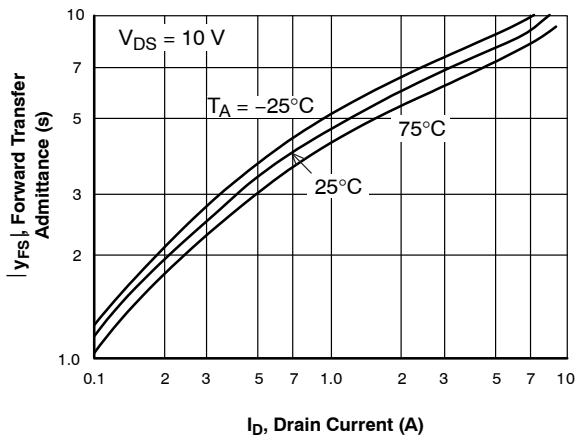


Figure 7.  $|y_{fs}| - I_D$

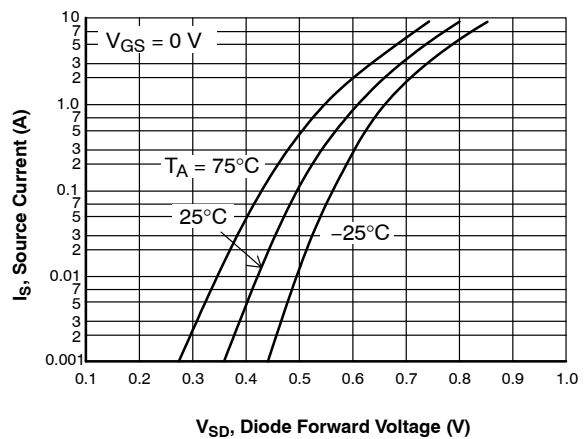


Figure 8.  $I_S - V_{SD}$

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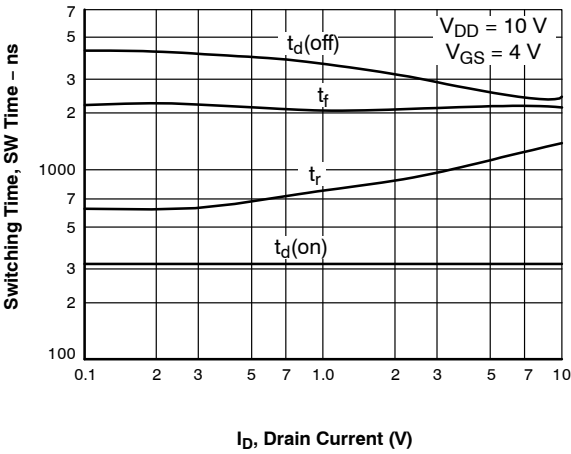


Figure 9. SW Time -  $I_D$

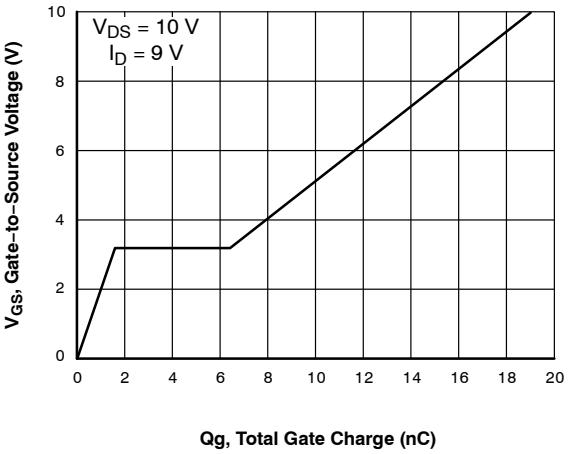


Figure 10.  $V_{GS}$  -  $Q_g$

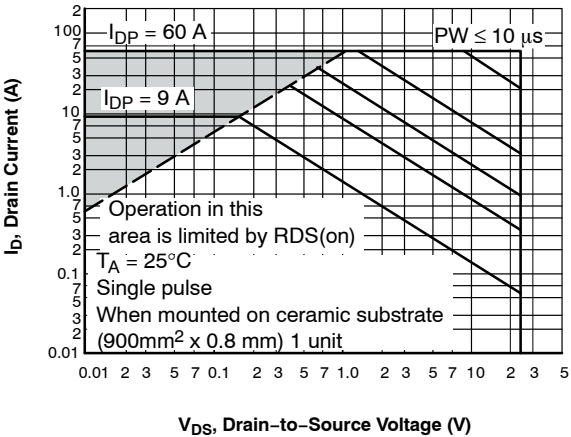


Figure 11. ASO

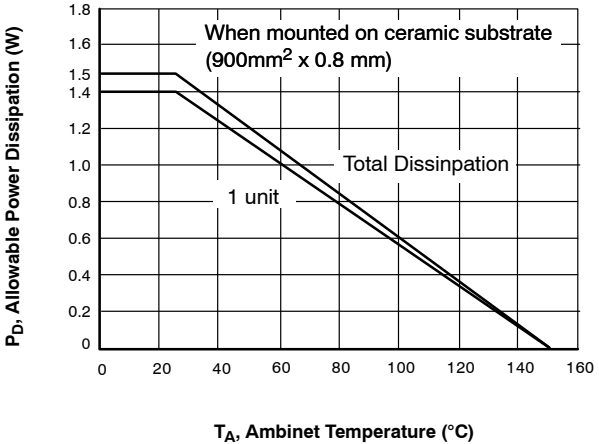
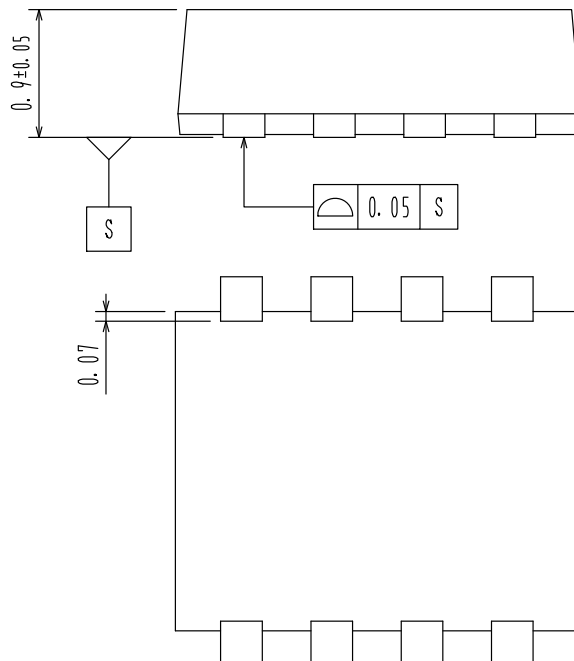
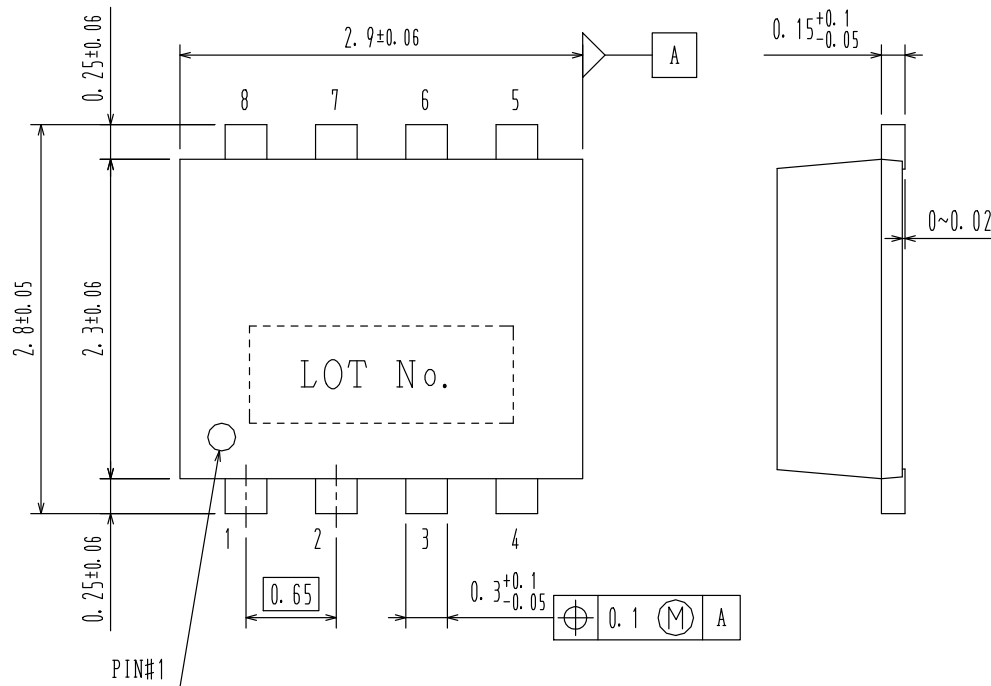


Figure 12.  $P_D$  -  $T_A$


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


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**ISSUE O**

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