

N- and P-Channel 20V(D-S) MOSFET

Features

- Nch + Pch MOSFET
- ON-resistance Nch : $R_{DS(on)1}=34m\Omega(\text{typ.})$
Pch : $R_{DS(on)1}=65m\Omega(\text{typ.})$
- 1.8V drive
- Halogen free compliance

Specifications

Absolute Maximum Ratings at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	N-channel	P-channel	Unit
Drain-to-Source Voltage	V_{DSS}		20	-20	V
Gate-to-Source Voltage	V_{GSS}		± 10	± 10	V
Drain Current (DC)	I_D		4	-3	A
Drain Current (Pulse)	I_{DP}	$PW \leq 10\mu\text{s}$, duty cycle $\leq 1\%$	20	-20	A
Allowable Power Dissipation	PD	When mounted on ceramic substrate (900mm ² ×0.8mm) 1unit	1.0		W
Total Dissipation	P_T	When mounted on ceramic substrate (900mm ² ×0.8mm)	1.2		W
Channel Temperature	T_{ch}		150		$^\circ\text{C}$
Storage Temperature	T_{stg}		-55 to +150		$^\circ\text{C}$

This product is designed to "ESD immunity < 200V**", so please take care when handling.

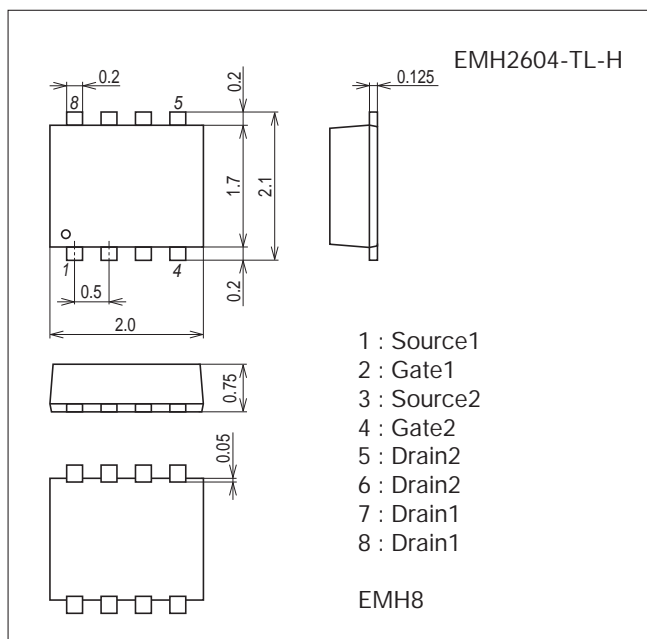
* Machine Model

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Package Dimensions

unit : mm (typ)

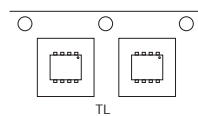
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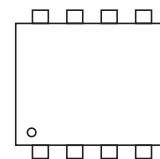
Product & Package Information

- Package : EMH8
- JEITA, JEDEC : -
- Minimum Packing Quantity : 3,000 pcs./reel

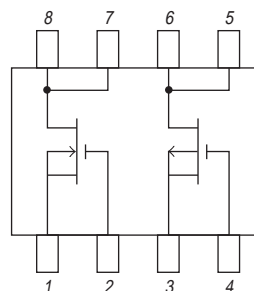
Packing Type : TL



Marking



Electrical Connection

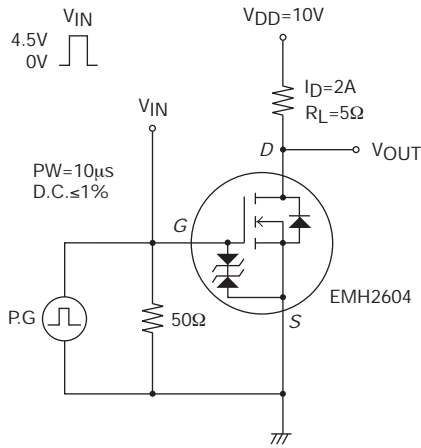


Electrical Characteristics at Ta=25°C

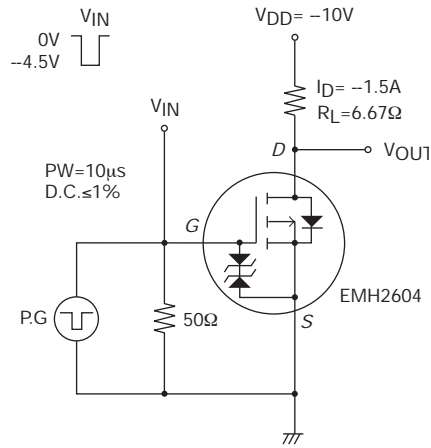
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[N-channel]						
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	I _D =1mA, V _{GS} =0V	20			V
Zero-Gate Voltage Drain Current	I _{DSS}	V _{DS} =20V, V _{GS} =0V			1	μA
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} =±8V, V _{DS} =0V			±10	μA
Cutoff Voltage	V _{GS(off)}	V _{DS} =10V, I _D =1mA	0.4		1.3	V
Forward Transfer Admittance	y _{fs}	V _{DS} =10V, I _D =2A		3.4		S
Static Drain-to-Source On-State Resistance	R _{DS(on)1}	I _D =4A, V _{GS} =4.5V		34	45	mΩ
	R _{DS(on)2}	I _D =1A, V _{GS} =2.5V		49	67	mΩ
	R _{DS(on)3}	I _D =0.5A, V _{GS} =1.8V		74	115	mΩ
Input Capacitance	C _{iss}	V _{DS} =10V, f=1MHz		345		pF
Output Capacitance	C _{oss}			67		pF
Reverse Transfer Capacitance	C _{rss}			52		pF
Turn-ON Delay Time	t _{d(on)}		See specified Test Circuit.		9.2	
Rise Time	t _r			60		ns
Turn-OFF Delay Time	t _{d(off)}			30		ns
Fall Time	t _f			38		ns
Total Gate Charge	Q _g	V _{DS} =10V, V _{GS} =4.5V, I _D =4A			4.7	
Gate-to-Source Charge	Q _{gs}			0.65		nC
Gate-to-Drain "Miller" Charge	Q _{gd}			1.6		nC
Diode Forward Voltage	V _{SD}	I _S =4A, V _{GS} =0V		0.8	1.2	V
[P-channel]						
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	I _D =-1mA, V _{GS} =0V	-20			V
Zero-Gate Voltage Drain Current	I _{DSS}	V _{DS} =-20V, V _{GS} =0V			-1	μA
Gate-to-Source Leakage Current	I _{GSS}	V _{GS} =±8V, V _{DS} =0V			±10	μA
Cutoff Voltage	V _{GS(off)}	V _{DS} =-10V, I _D =-1mA	-0.4		-1.3	V
Forward Transfer Admittance	y _{fs}	V _{DS} =-10V, I _D =-1.5A		3.6		S
Static Drain-to-Source On-State Resistance	R _{DS(on)1}	I _D =-3A, V _{GS} =-4.5V		65	85	mΩ
	R _{DS(on)2}	I _D =-1A, V _{GS} =-2.5V		98	137	mΩ
	R _{DS(on)3}	I _D =-0.5A, V _{GS} =-1.8V		155	235	mΩ
Input Capacitance	C _{iss}	V _{DS} =-10V, f=1MHz		320		pF
Output Capacitance	C _{oss}			66		pF
Reverse Transfer Capacitance	C _{rss}			50		pF
Turn-ON Delay Time	t _{d(on)}		See specified Test Circuit.		7.1	
Rise Time	t _r			21		ns
Turn-OFF Delay Time	t _{d(off)}			37		ns
Fall Time	t _f			32		ns
Total Gate Charge	Q _g	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-3A			4.0	
Gate-to-Source Charge	Q _{gs}			0.6		nC
Gate-to-Drain "Miller" Charge	Q _{gd}			1.1		nC
Diode Forward Voltage	V _{SD}	I _S =-3A, V _{GS} =0V		-0.83	-1.2	V

Switching Time Test Circuit

[N-channel]

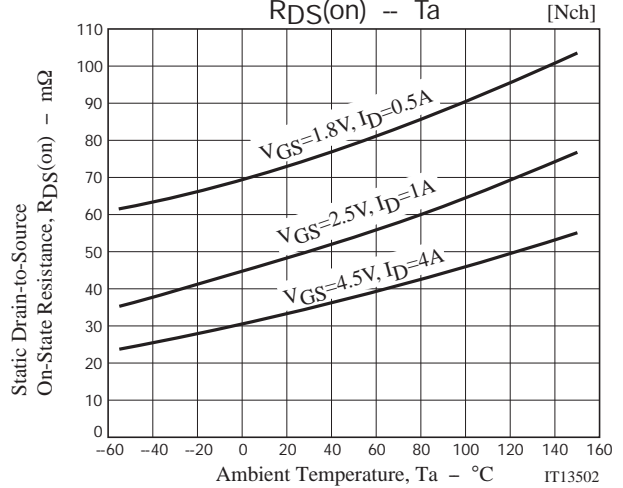
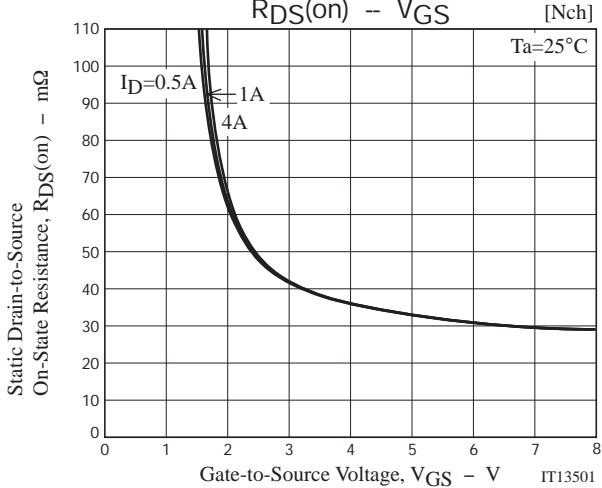
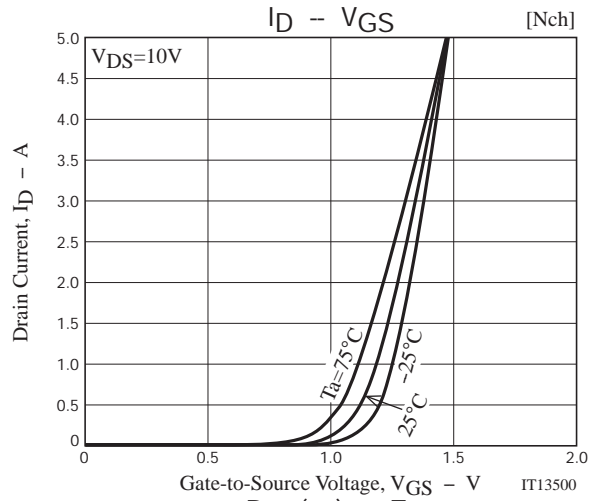
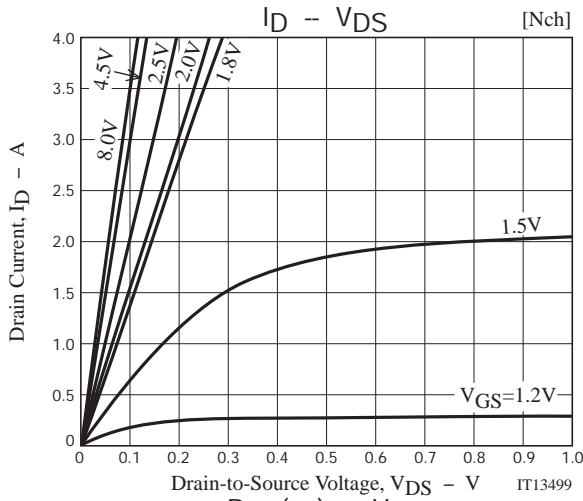


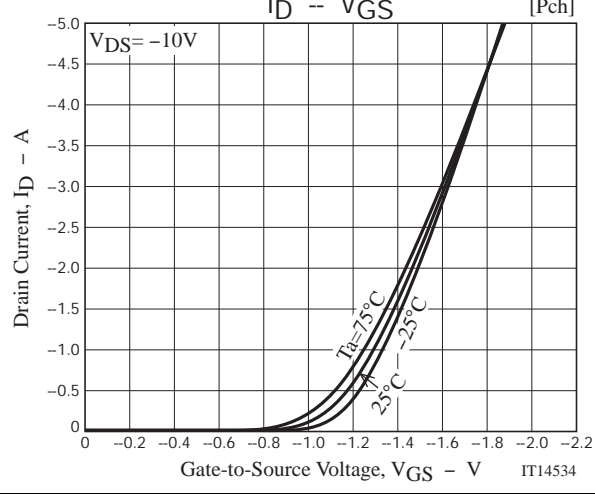
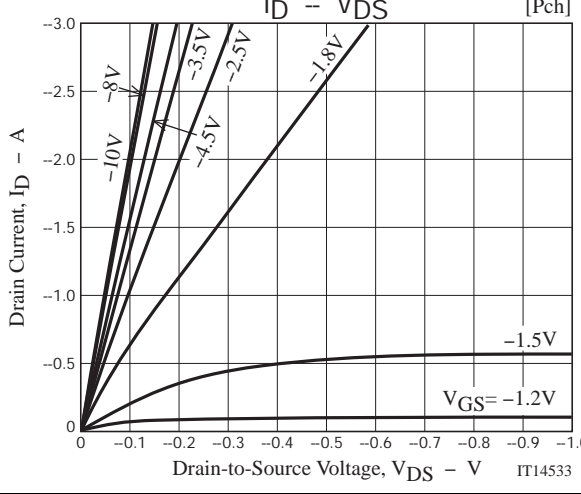
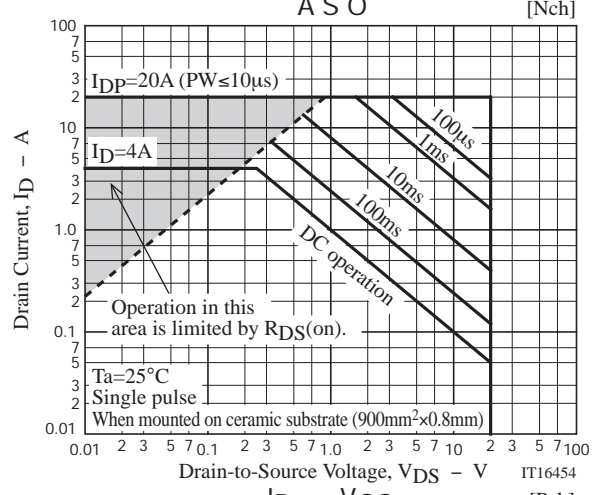
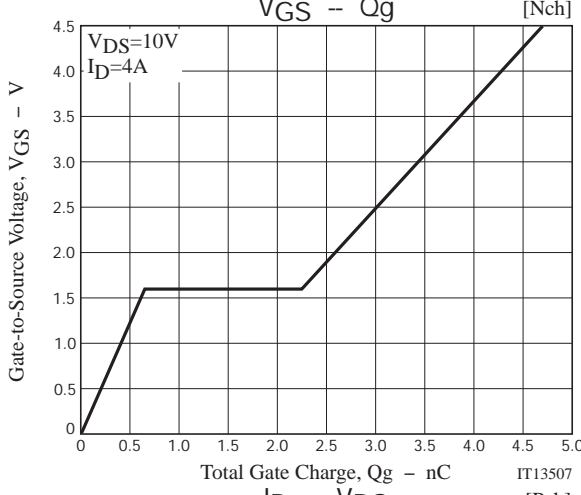
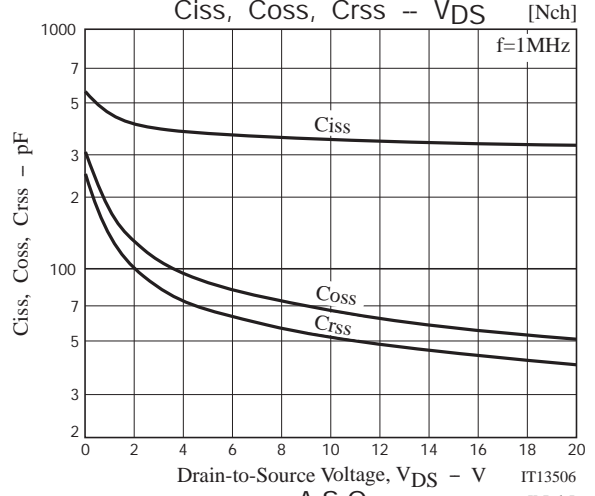
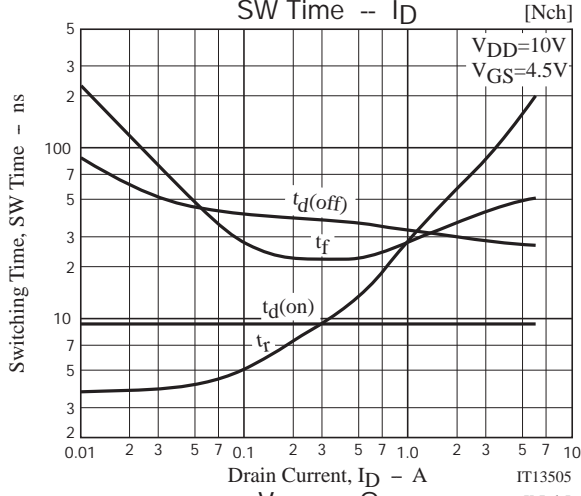
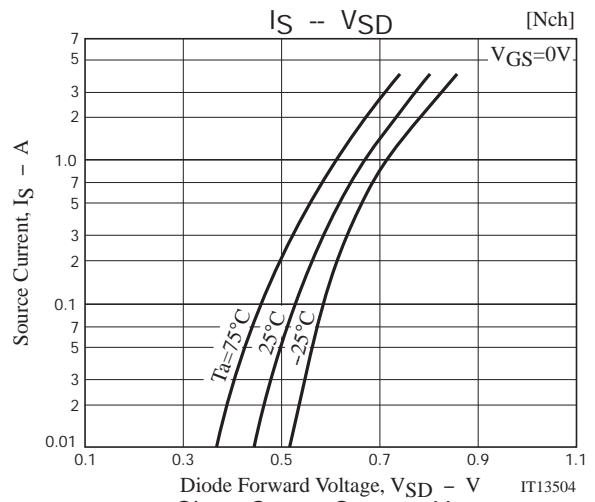
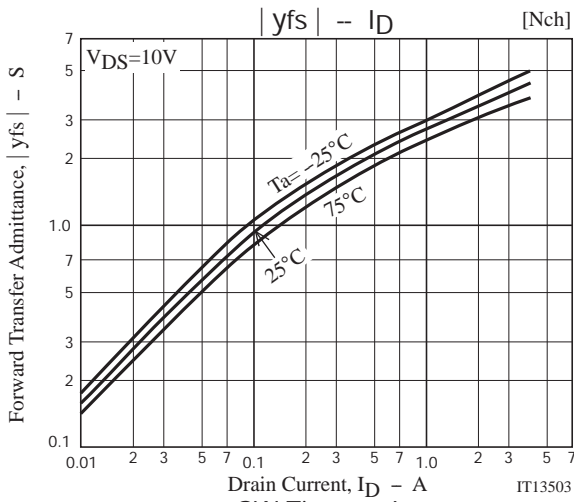
[P-channel]

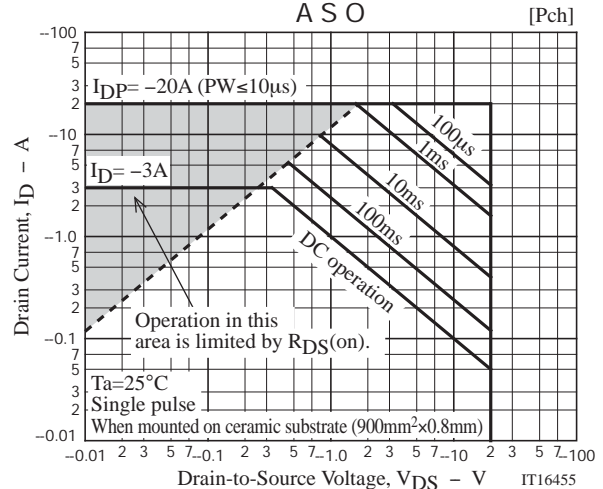
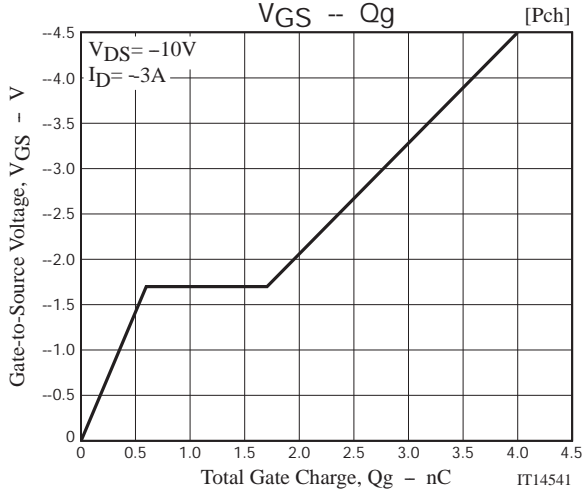
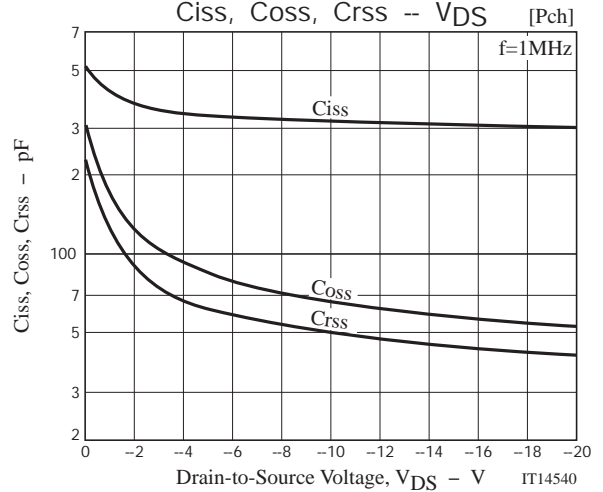
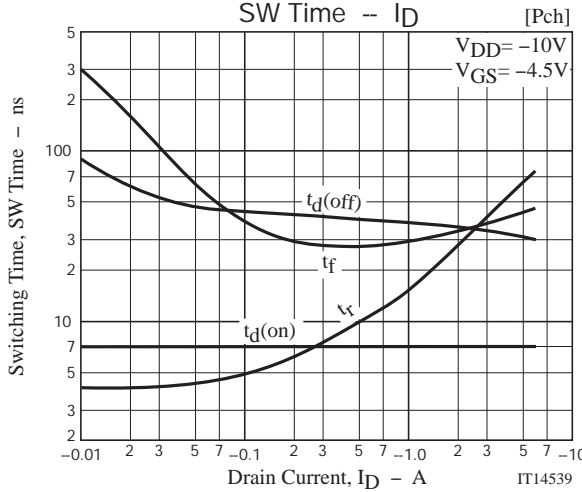
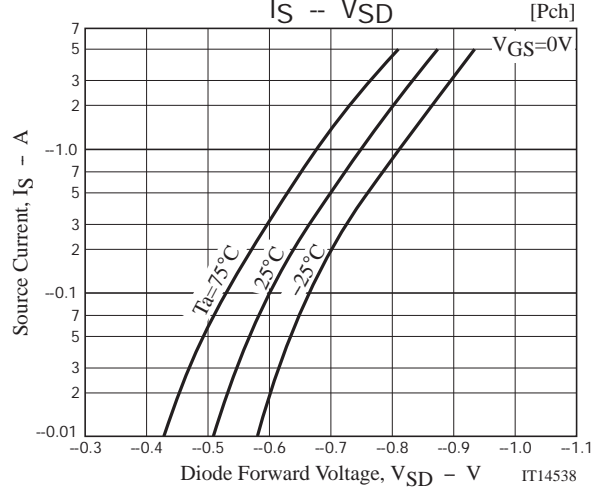
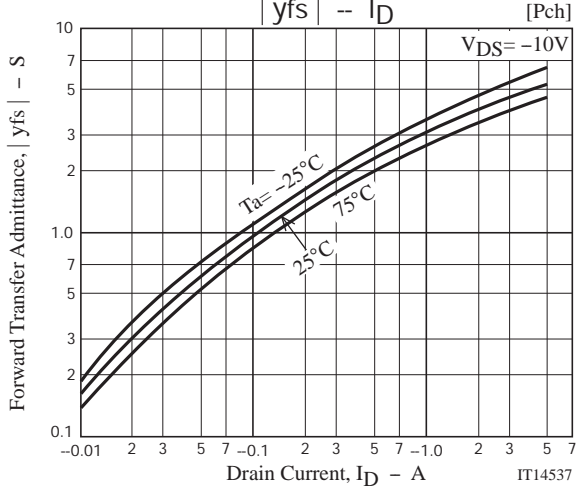
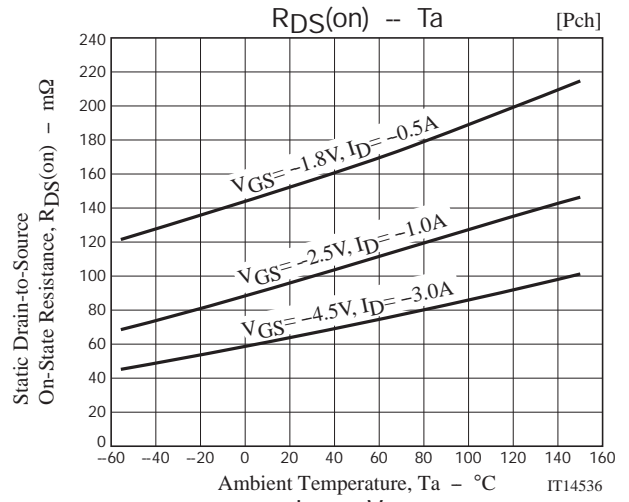
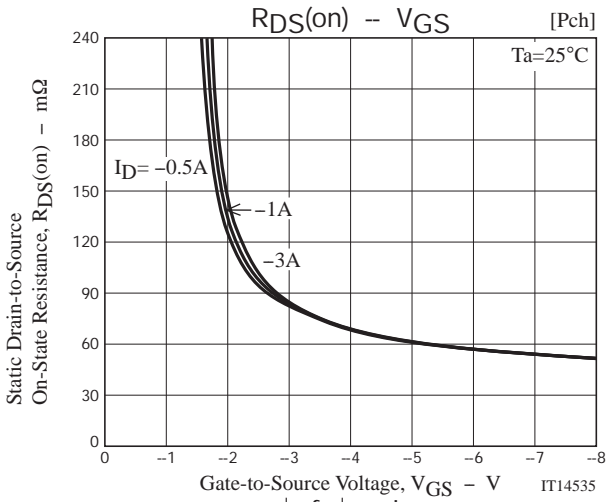


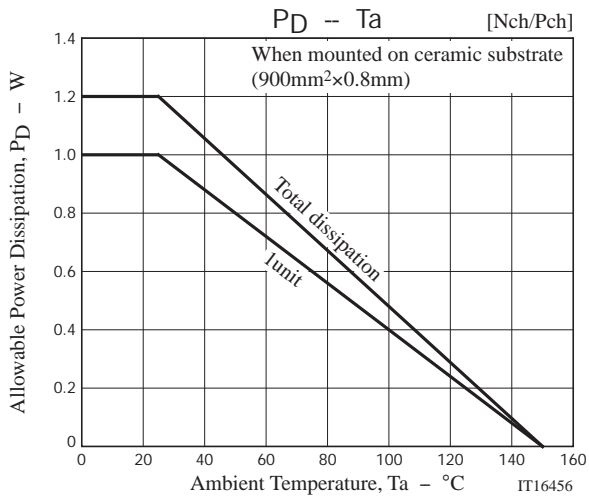
Ordering Information

Device	Package	Shipping	memo
EMH2604-TL-H	EMH8	3,000pcs./reel	Pb Free and Halogen Free



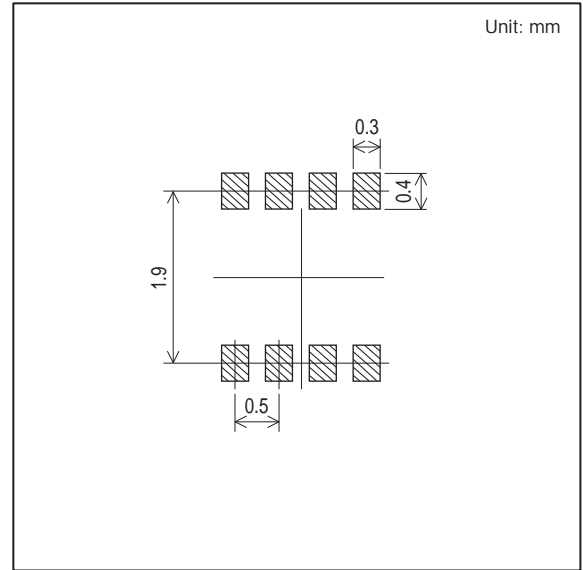
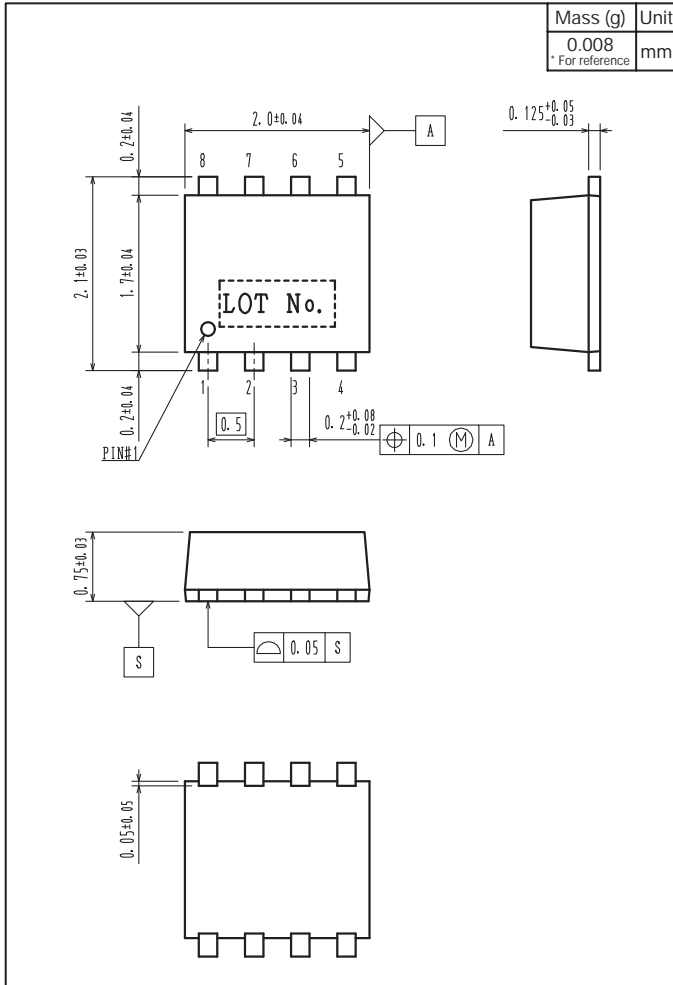






Outline Drawing
EMH2604-TL-H

Land Pattern Example



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