

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

Features

- Nch + Pch MOSFET
- ON-resistance Nch : $R_{DS(on)1}=34m\Omega$ (typ.)
Pch : $R_{DS(on)1}=65m\Omega$ (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_{DS}		20	-20	V
Gate-to-Source Voltage	V_{GS}		± 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	P_D	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.

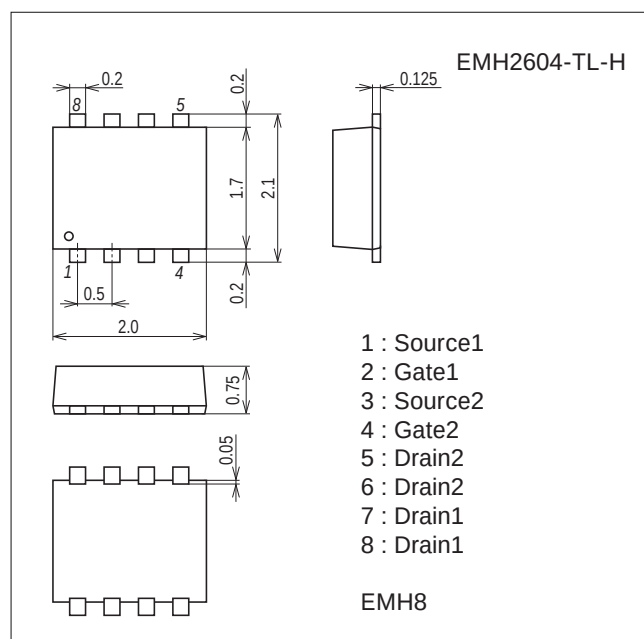
* Machine Model

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)

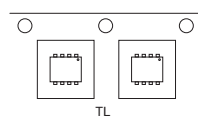
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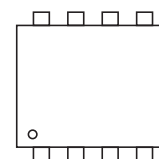
Product & Package Information

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

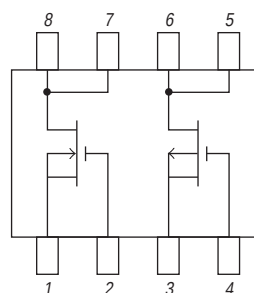
Packing Type : TL



Marking



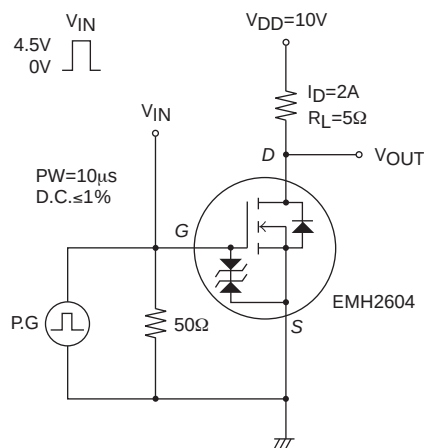
Electrical Connection



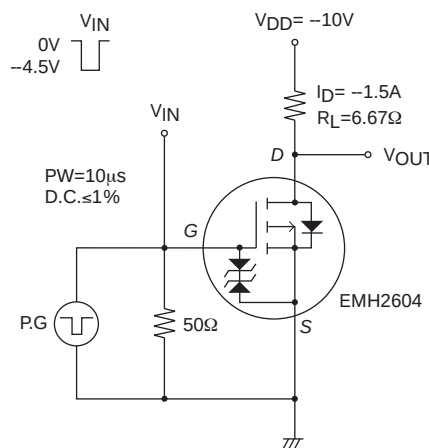
Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[N-channel]						
Drain-to-Source Breakdown Voltage	V(BR)DSS	ID=1mA, VGS=0V	20			V
Zero-Gate Voltage Drain Current	IDSS	VDS=20V, VGS=0V			1	μA
Gate-to-Source Leakage Current	IGSS	VGS=±8V, VDS=0V			±10	μA
Cutoff Voltage	VGS(off)	VDS=10V, ID=1mA	0.4		1.3	V
Forward Transfer Admittance	yfs	VDS=10V, ID=2A		3.4		S
Static Drain-to-Source On-State Resistance	RDS(on)1	ID=4A, VGS=4.5V		34	45	mΩ
	RDS(on)2	ID=1A, VGS=2.5V		49	67	mΩ
	RDS(on)3	ID=0.5A, VGS=1.8V		74	115	mΩ
Input Capacitance	Ciss	VDS=10V, f=1MHz		345		pF
Output Capacitance	Coss			67		pF
Reverse Transfer Capacitance	Crss			52		pF
Turn-ON Delay Time	tD(on)	See specified Test Circuit.		9.2		ns
Rise Time	tR			60		ns
Turn-OFF Delay Time	tD(off)			30		ns
Fall Time	tF			38		ns
Total Gate Charge	Qg	VDS=10V, VGS=4.5V, ID=4A		4.7		nC
Gate-to-Source Charge	Qgs			0.65		nC
Gate-to-Drain "Miller" Charge	Qgd			1.6		nC
Diode Forward Voltage	VSD	IS=4A, VGS=0V		0.8	1.2	V
[P-channel]						
Drain-to-Source Breakdown Voltage	V(BR)DSS	ID=-1mA, VGS=0V	-20			V
Zero-Gate Voltage Drain Current	IDSS	VDS=-20V, VGS=0V			-1	μA
Gate-to-Source Leakage Current	IGSS	VGS=±8V, VDS=0V			±10	μA
Cutoff Voltage	VGS(off)	VDS=-10V, ID=-1mA	-0.4		-1.3	V
Forward Transfer Admittance	yfs	VDS=-10V, ID=-1.5A		3.6		S
Static Drain-to-Source On-State Resistance	RDS(on)1	ID=-3A, VGS=-4.5V		65	85	mΩ
	RDS(on)2	ID=-1A, VGS=-2.5V		98	137	mΩ
	RDS(on)3	ID=-0.5A, VGS=-1.8V		155	235	mΩ
Input Capacitance	Ciss	VDS=-10V, f=1MHz		320		pF
Output Capacitance	Coss			66		pF
Reverse Transfer Capacitance	Crss			50		pF
Turn-ON Delay Time	tD(on)	See specified Test Circuit.		7.1		ns
Rise Time	tR			21		ns
Turn-OFF Delay Time	tD(off)			37		ns
Fall Time	tF			32		ns
Total Gate Charge	Qg	VDS=-10V, VGS=-4.5V, ID=-3A		4.0		nC
Gate-to-Source Charge	Qgs			0.6		nC
Gate-to-Drain "Miller" Charge	Qgd			1.1		nC
Diode Forward Voltage	VSD	IS=-3A, VGS=0V		-0.83	-1.2	V

Switching Time Test Circuit
[N-channel]

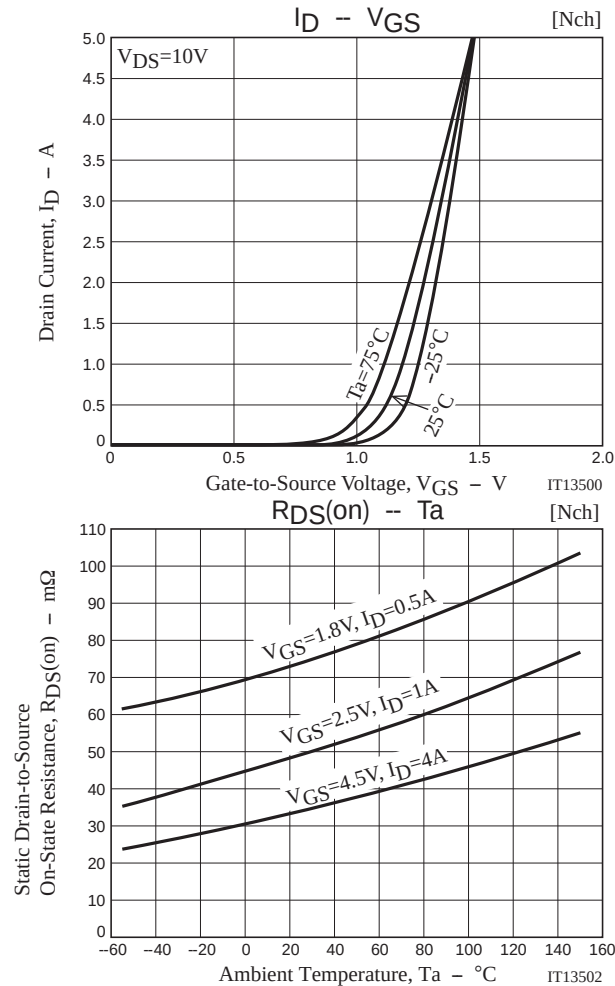
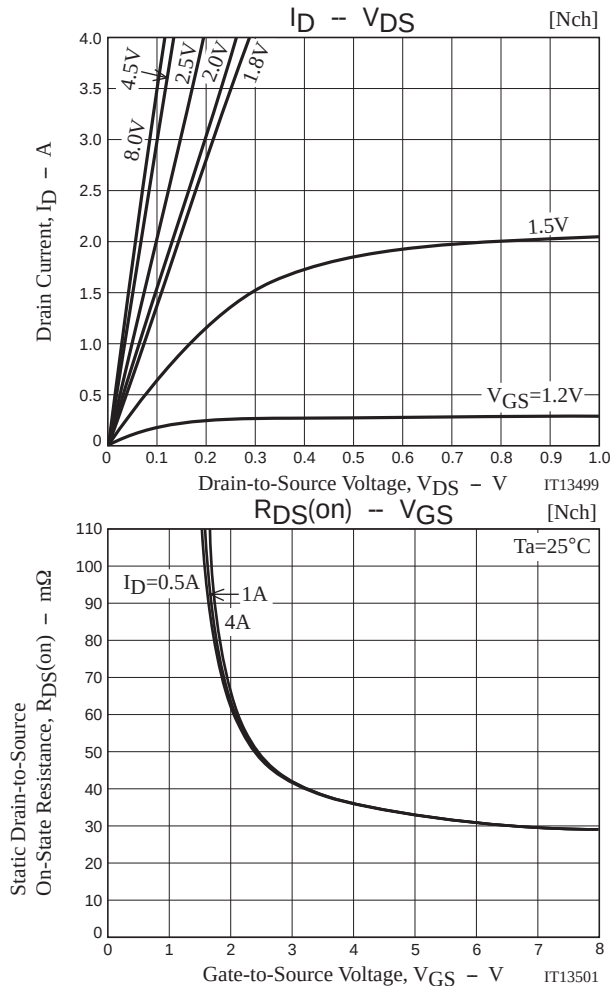


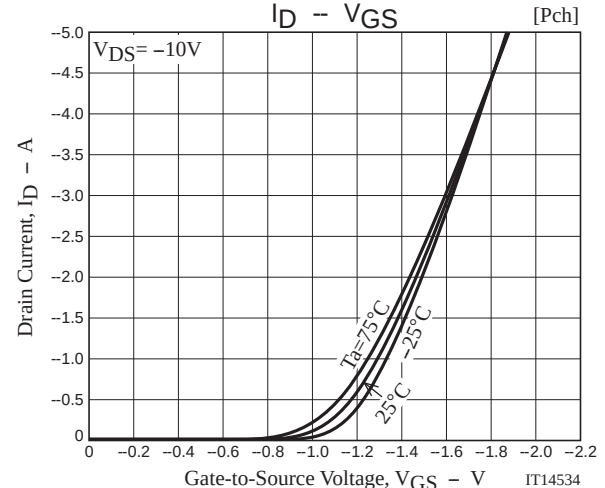
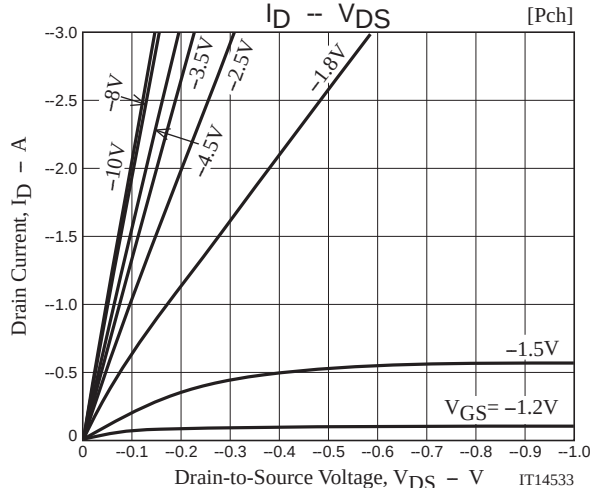
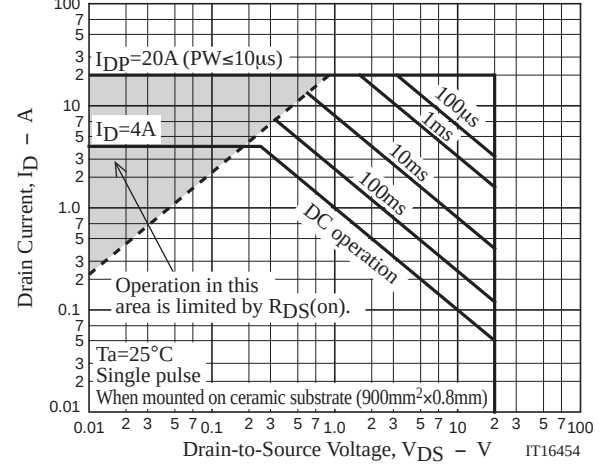
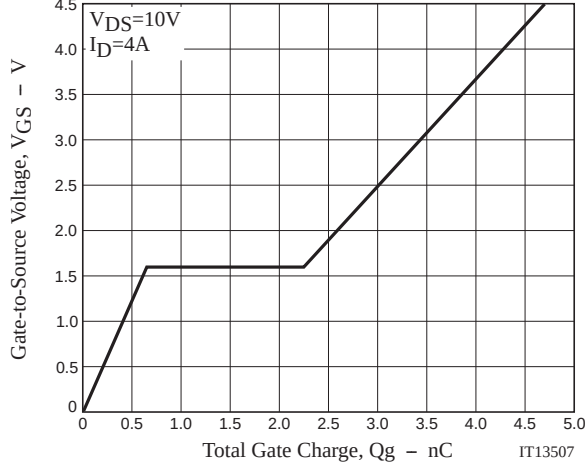
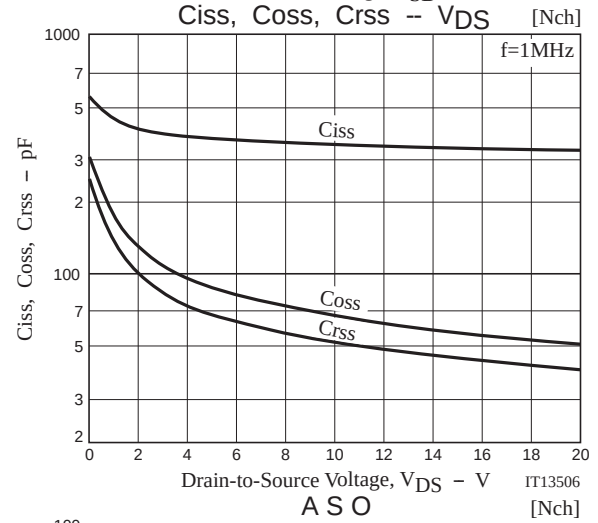
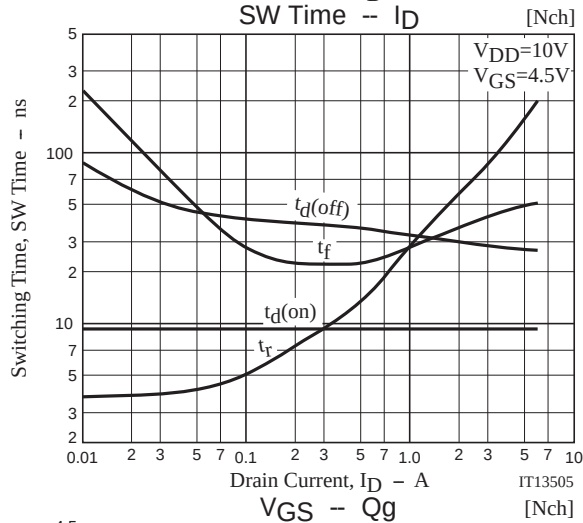
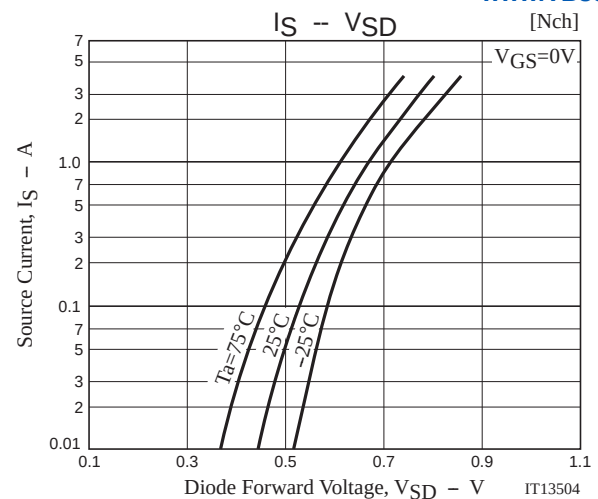
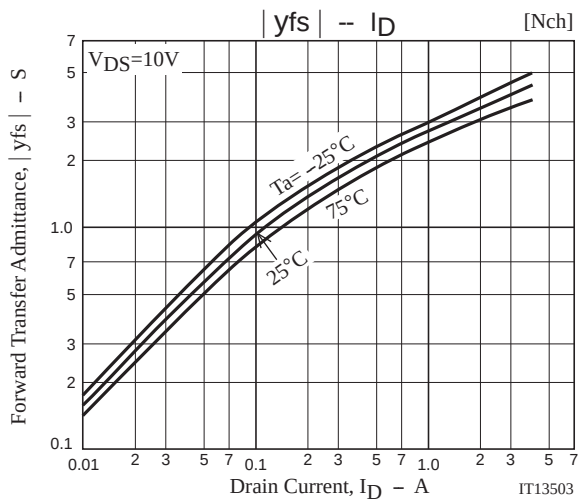
[P-channel]

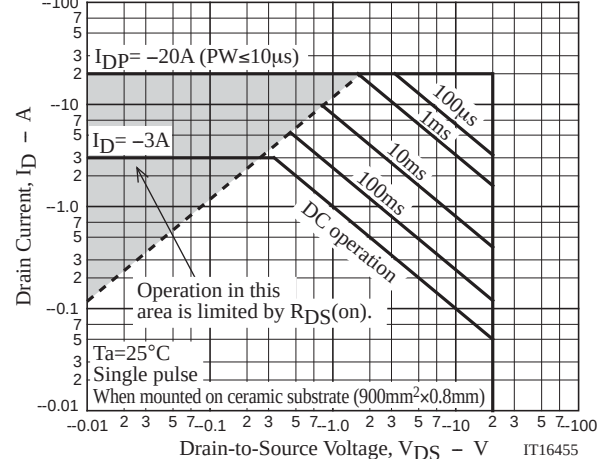
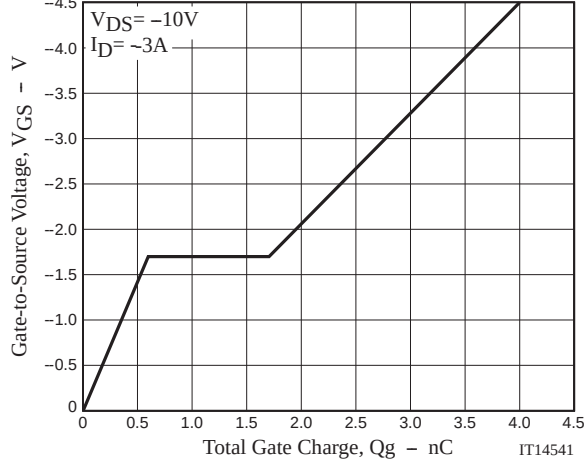
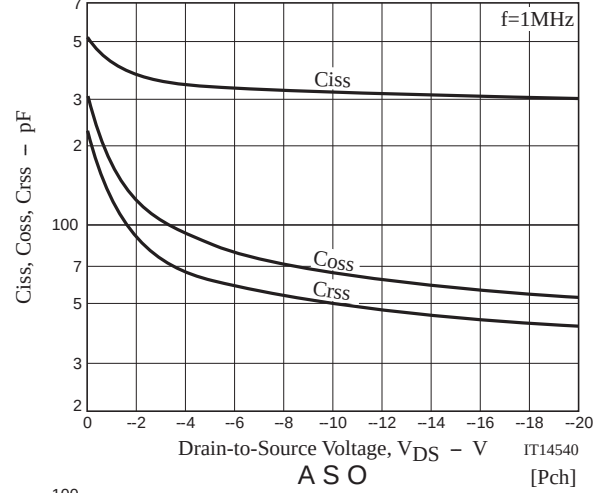
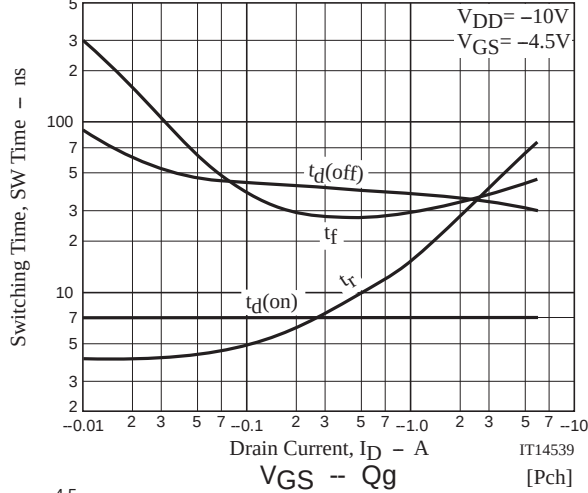
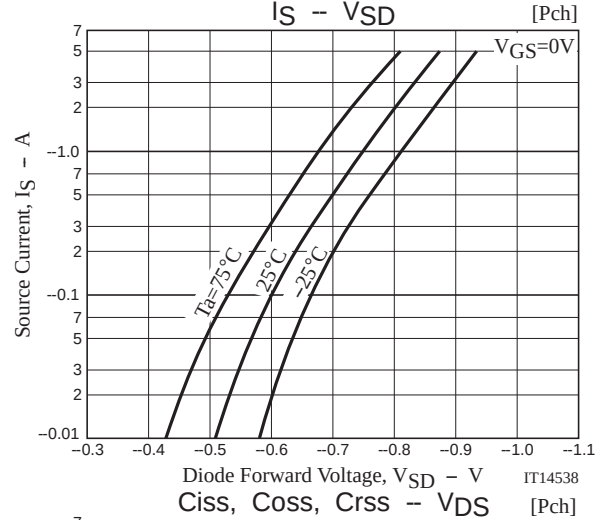
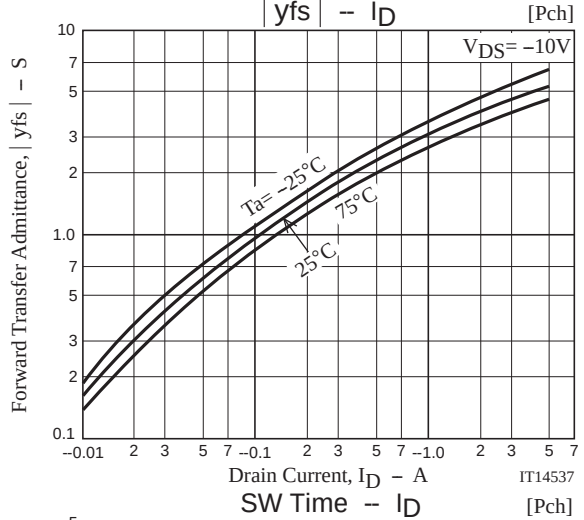
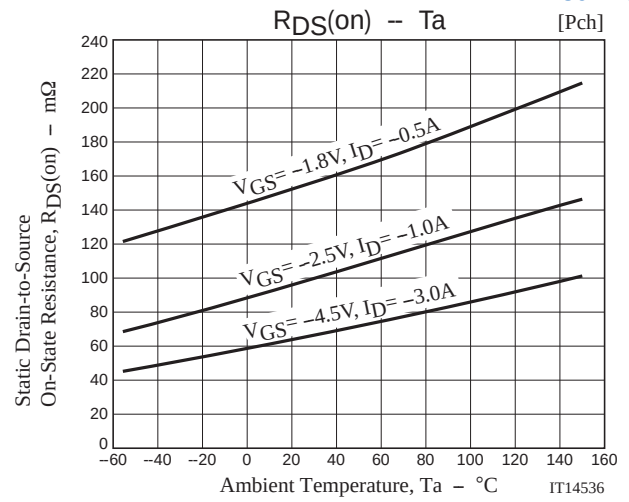
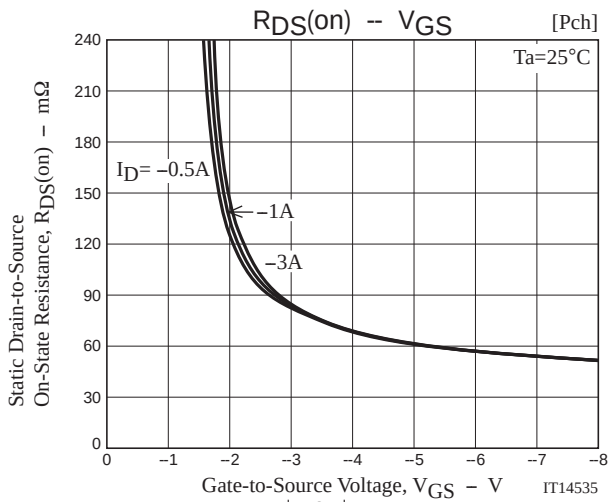


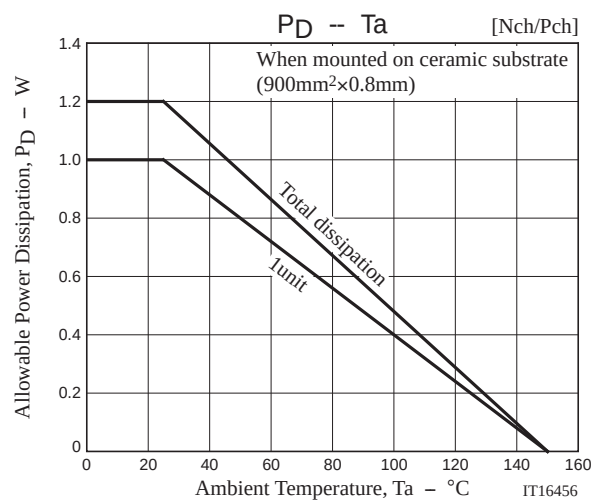
Ordering Information

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



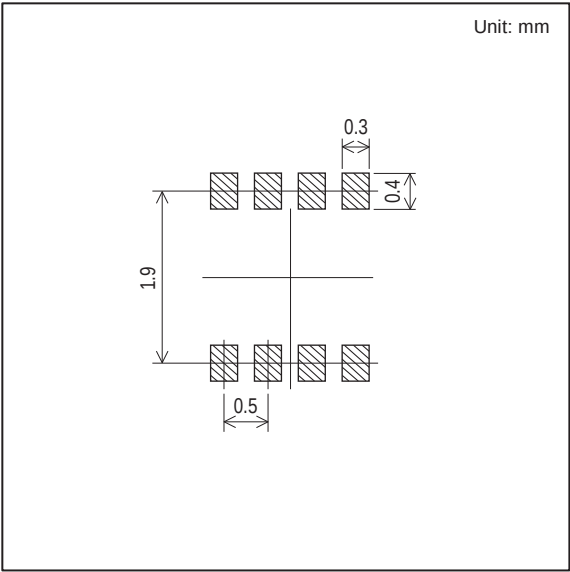
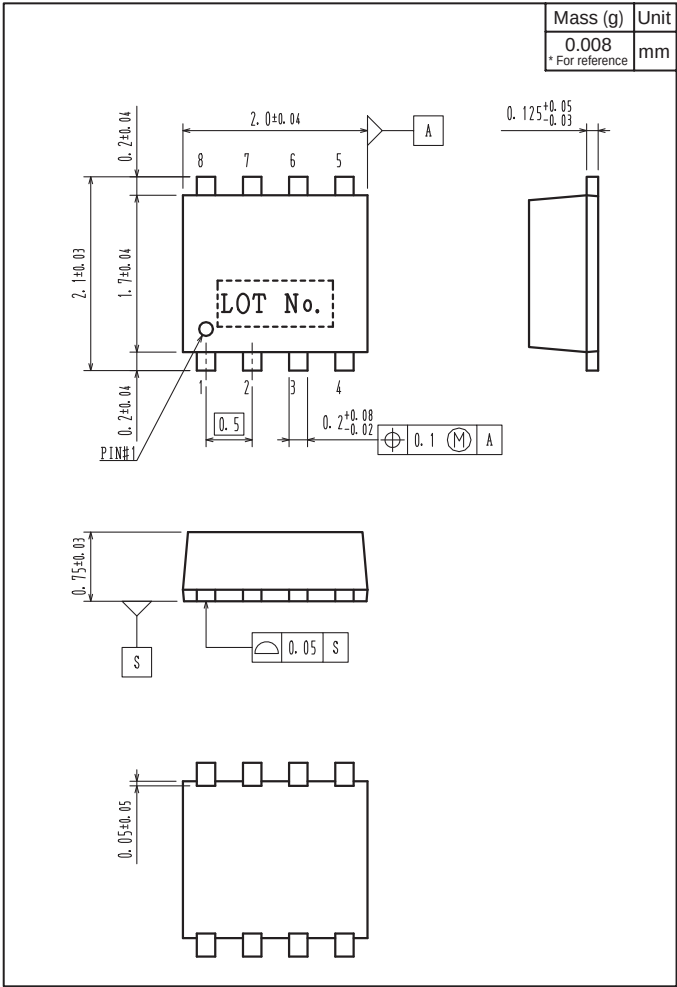






Outline Drawing
EMH2604-TL-H

Land Pattern Example



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