1.2V Drive Nch+Pch MOSFET

EM6M2

●Structure
Silicon N-channel MOSFET /
Silicon P-channel MOSFET

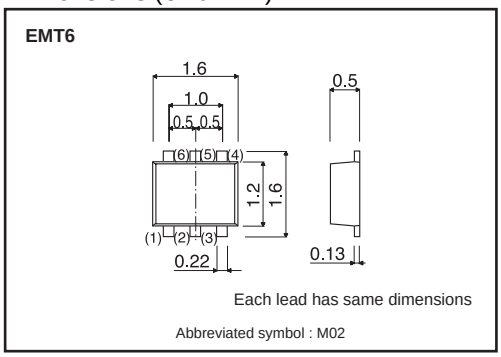
●Features
1) Nch MOSFET and Pch MOSFET are put in EMT6 package.
2) High-speed switching.
3) Low voltage drive (1.2V drive).
4) Built-in G-S Protection Diode.

●Applications
Switching

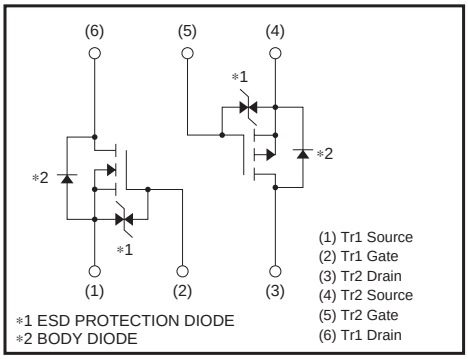
●Packaging specifications

Type	Package	Taping
	Code	T2R
	Basic ordering unit (pieces)	8000
EM6M2		◯

●Dimensions (Unit : mm)



●Inner circuit



●Absolute maximum ratings (Ta=25°C)

Parameter		Symbol	Limits		Unit
			Tr1 : N-ch	Tr2 : P-ch	
Drain-source voltage		V_{DSS}	20	−20	V
Gate-source voltage		V_{GSS}	±8	±10	V
Drain current	Continuous	I_D	±200	±200	mA
	Pulsed	I_{DP}*1	±400	±400	mA
Total power dissipation		P_D*2	150		mW / TOTAL
			120		mW / ELEMENT
Channel temperature		Tch	150		°C
Range of storage temperature		Tstg	−55 to +150		°C

*1 Pw≦10μs, Duty cycle≦1%
*2 Each terminal mounted on a recommended land

N-ch

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	–	–	±10	μA	V_{GS}= ±8V, V_{DS}=0V
Drain-source breakdown voltage	$V_{(BR)\ DSS}$	20	–	–	V	I_D= 1mA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}	–	–	1	μA	V_{DS}= 20V, V_{GS}=0V
Gate threshold voltage	$V_{GS\ (th)}$	0.3	–	1.0	V	V_{DS}= 10V, I_D= 1mA
Static drain-source on-state resistance	$R_{DS\ (on)}$ *	–	0.7	1.0	Ω	I_D= 200mA, V_{GS}= 4.0V
		–	0.8	1.2	Ω	I_D= 200mA, V_{GS}= 2.5V
		–	1.0	1.4	Ω	I_D= 200mA, V_{GS}= 1.8V
		–	1.2	2.4	Ω	I_D= 40mA, V_{GS}= 1.5V
		–	1.6	4.8	Ω	I_D= 20mA, V_{GS}= 1.2V
Forward transfer admittance	$\|Y_{fs}\|$ *	0.2	–	–	S	V_{DS}= 10V, I_D= 200mA
Input capacitance	C_{iss}	–	25	–	pF	V_{DS}= 10V
Output capacitance	C_{oss}	–	10	–	pF	V_{GS}= 0V
Reverse transfer capacitance	C_{rss}	–	10	–	pF	f=1MHz
Turn-on delay time	$t_{d\ (on)}$ *	–	5	–	ns	V_{DD}≒ 10V I_D= 150mA V_{GS}= 4.0V R_L ≒ 67Ω R_G= 10Ω
Rise time	t_r *	–	10	–	ns	
Turn-off delay time	$t_{d\ (off)}$ *	–	15	–	ns	
Fall time	t_f *	–	10	–	ns	

*Pulsed

●Body diode characteristics (Source-drain) (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD} *	–	–	1.2	V	I_S= 100mA, V_{GS}=0V

* Pulsed

P-ch

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	–	–	±10	μA	V_{GS}= ±10V, V_{DS}=0V
Drain-source breakdown voltage	$V_{(BR)\ DSS}$	–20	–	–	V	I_D= –1mA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}	–	–	–1	μA	V_{DS}= –20V, V_{GS}=0V
Gate threshold voltage	$V_{GS\ (th)}$	–0.3	–	–1.0	V	V_{DS}= –10V, I_D= –100μA
Static drain-source on-state resistance	$R_{DS\ (on)}$ *	–	0.8	1.2	Ω	I_D= –200mA, V_{GS}= –4.5V
		–	1.0	1.5	Ω	I_D= –100mA, V_{GS}= –2.5V
		–	1.3	2.2	Ω	I_D= –100mA, V_{GS}= –1.8V
		–	1.6	3.5	Ω	I_D= –40mA, V_{GS}= –1.5V
		–	2.4	9.6	Ω	I_D= –10mA, V_{GS}= –1.2V
Forward transfer admittance	$\|Y_{fs}\|$ *	0.2	–	–	S	V_{DS}= –10V, I_D= –200mA
Input capacitance	C_{iss}	–	115	–	pF	V_{DS}= –10V
Output capacitance	C_{oss}	–	10	–	pF	V_{GS}= 0V
Reverse transfer capacitance	C_{rss}	–	6	–	pF	f=1MHz
Turn-on delay time	$t_{d\ (on)}$ *	–	6	–	ns	V_{DD}≒ –10V I_D= –100mA V_{GS}= –4.5V R_L ≒ 100Ω R_G= 10Ω
Rise time	t_r *	–	4	–	ns	
Turn-off delay time	$t_{d\ (off)}$ *	–	17	–	ns	
Fall time	t_f *	–	17	–	ns	

*Pulsed

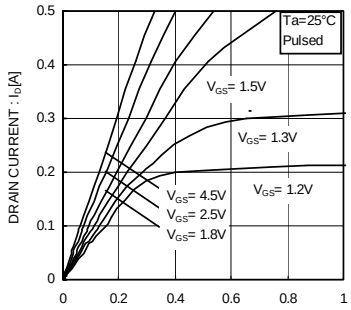
●Body diode characteristics (Source-drain) (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD} *	–	–	–1.2	V	I_S= –200mA, V_{GS}=0V

* Pulsed

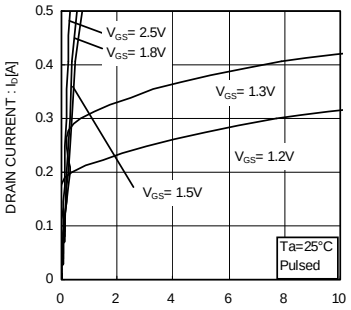
N-ch

●Electrical characteristic curve



DRAIN-SOURCE VOLTAGE : V_{DS}[V]

Fig.1 Typical Output Characteristics(Ⅰ)



DRAIN-SOURCE VOLTAGE : V_{DS}[V]

Fig.2 Typical Output Characteristics(Ⅱ)

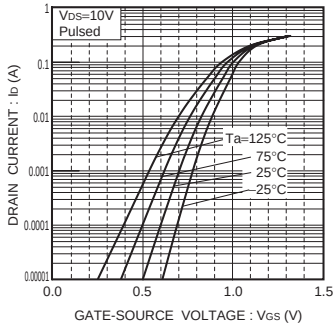
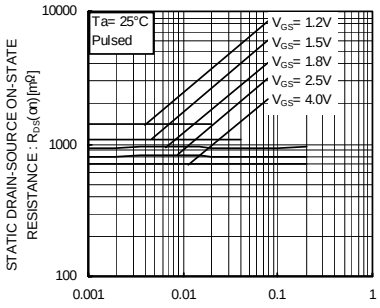
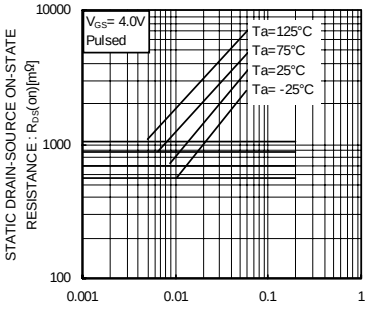


Fig.3 Typical transfer characteristics



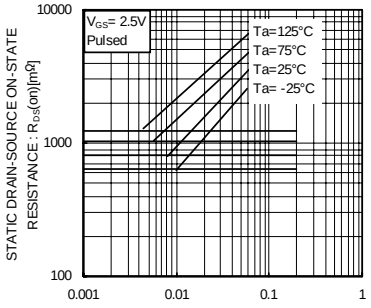
DRAIN-CURRENT : I_D[A]

Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)



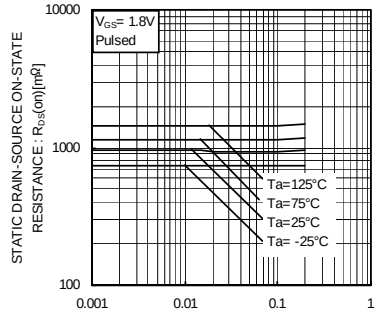
DRAIN-CURRENT : I_D[A]

Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)



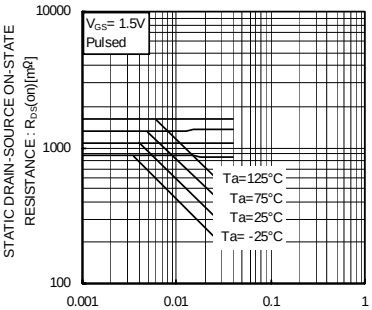
DRAIN-CURRENT : I_D[A]

Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)



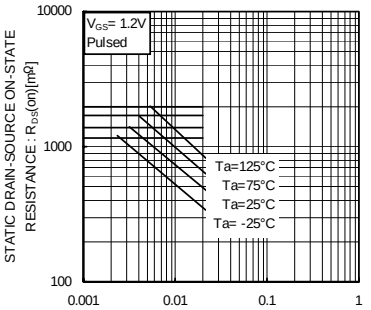
DRAIN-CURRENT : I_D[A]

Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)



DRAIN-CURRENT : I_D[A]

Fig.8 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)



DRAIN-CURRENT : I_D[A]

Fig.9 Static Drain-Source On-State Resistance vs. Drain Current(Ⅴ)

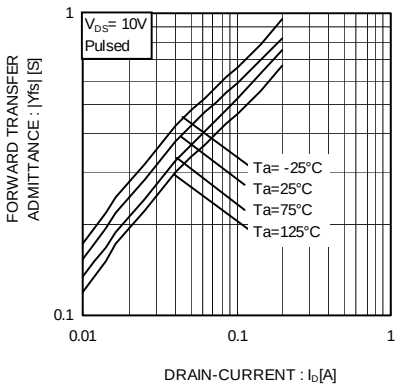


Fig.10 Forward Transfer Admittance vs. Drain Current

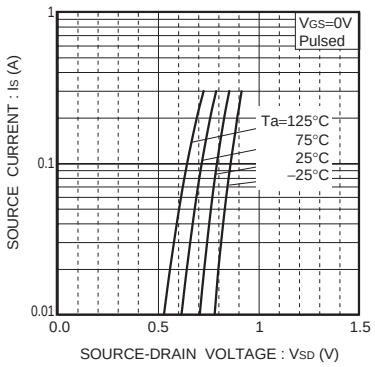


Fig.11 Source current vs. source-drain voltage

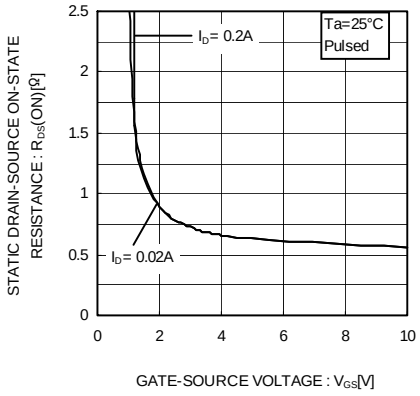


Fig.12 Static Drain-Source On-State Resistance vs. Gate Source Voltage

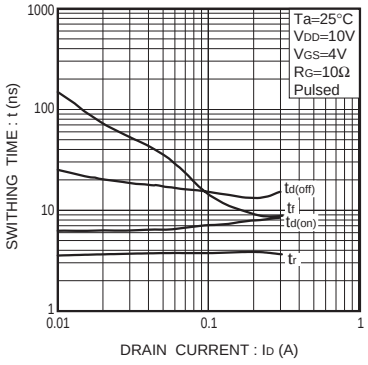


Fig.13 Switching characteristics

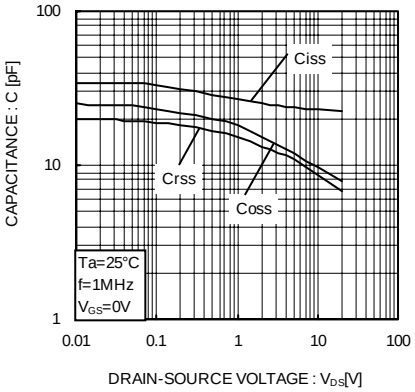


Fig.14 Typical Capacitance vs. Drain-Source Voltage

P-ch

●Electrical characteristic curve

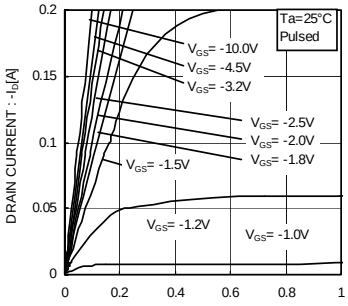


Fig.1 Typical output characteristics(Ⅰ)

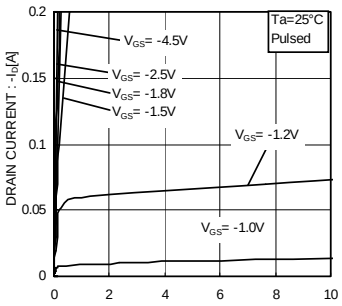


Fig.2 Typical output characteristics(Ⅱ)

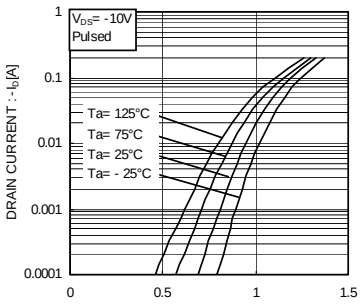


Fig.3 Typical Transfer Characteristics

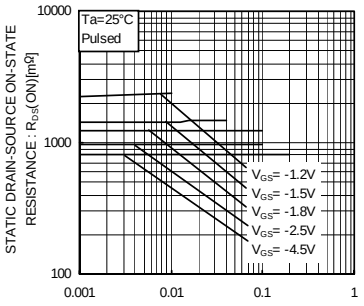


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(Ⅰ)

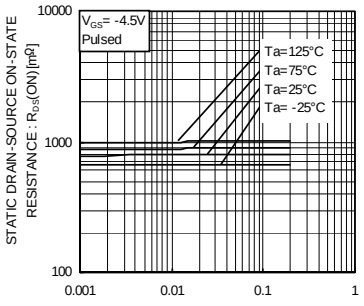


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(Ⅱ)

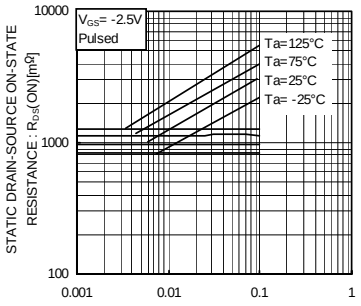


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current(Ⅲ)

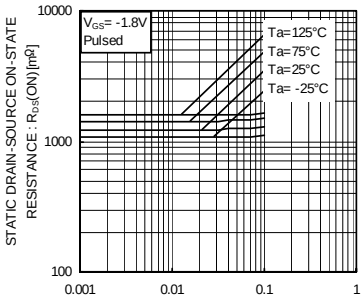


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current(Ⅳ)

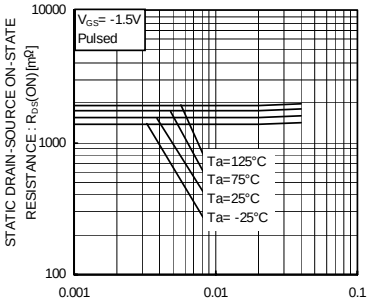


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current(Ⅴ)

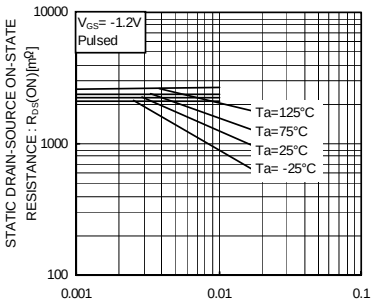


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current(Ⅵ)

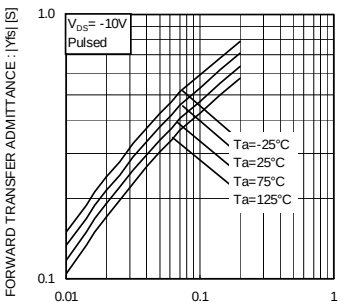


Fig.10 Forward Transfer Admittance vs. Drain Current

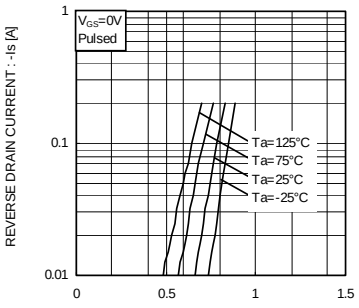


Fig.11 Reverse Drain Current vs. Sourse-Drain Voltage

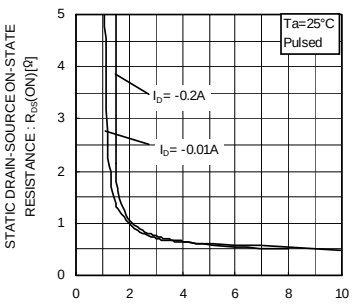


Fig.12 Static Drain-Source On-State Resistance vs. Gate Source Voltage

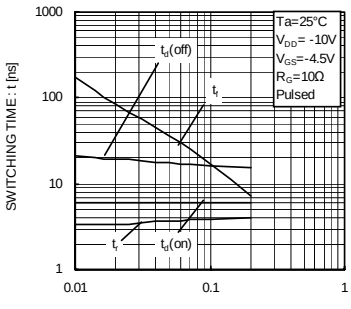


Fig.13 Switching Characteristics

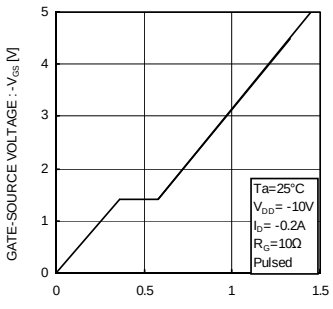


Fig.14 Dynamic Input Characteristics

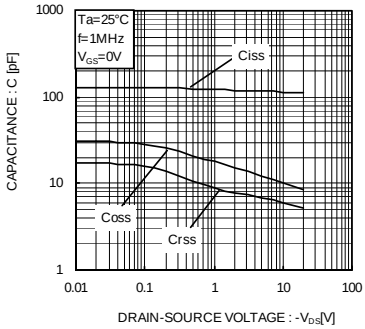


Fig.15 Typical Capacitance vs. Drain-Source Voltage

N-ch

●Measurement circuit

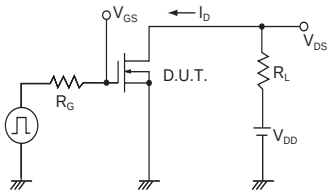


Fig.1-1 Switching Time Measurement circuit

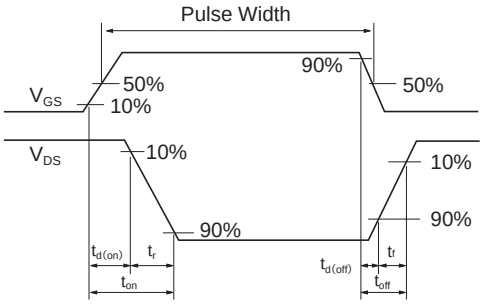


Fig.1-2 Switching Waveforms

P-ch

●Measurement circuit

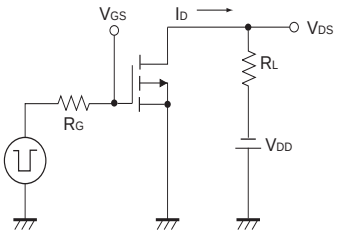


Fig.2-1 Switching Time Measurement circuit

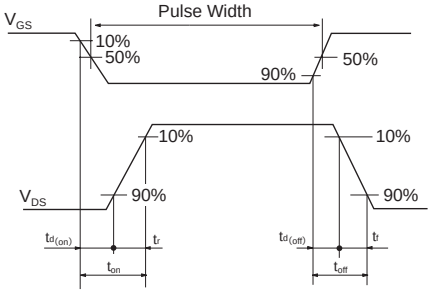


Fig.2-2 Switching Waveforms

●Notice

This product might cause chip aging and breakdown under the large electrified environment.
Please consider to design ESD protection circuit.

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