

# 1.2V Drive Nch + Nch MOSFET

## EM6K33

### ●Structure

silicon N-channel MOSFET

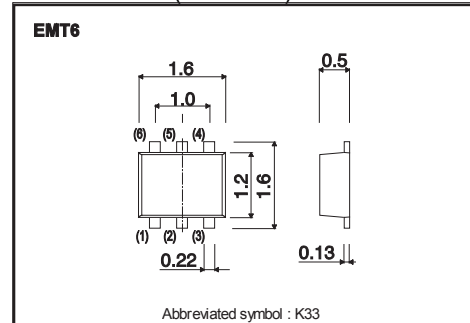
### ●Features

- 1) High speed switing.
- 2) Small package(EMT6).
- 3) Ultra low voltage drive(1.2V drive).

### ●Application

Switching

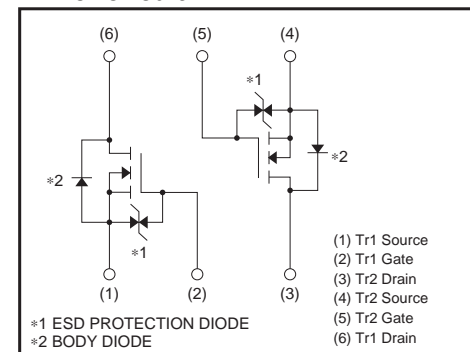
### ●Dimensions (Unit : mm)



### ●Packaging specifications

Type	Package	Taping
	Code	T2R
	Basic ordering unit (pieces)	8000
EM6K33		○

### ●Inner circuit



### ●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Drain-source voltage	$V_{DSS}$	50	V
Gate-source voltage	$V_{GSS}$	$\pm 8$	V
Drain current	Continuous	$I_D$	$\pm 200$ mA
	Pulsed	$I_{DP}$ *1	$\pm 800$ mA
Source current (Body Diode)	Continuous	$I_s$	125 mA
	Pulsed	$I_{sp}$ *1	800 mA
Power dissipation	$P_D$ *2	150	mW / TOTAL
		120	mW / ELEMENT
Channel temperature	$T_{ch}$	150	°C
Range of storage temperature	$T_{stg}$	-55 to +150	°C

\*1  $P_w \leq 10 \mu s$ , Duty cycle  $\leq 1\%$

\*2 Each terminal mounted on a recommended land.

### ●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to ambient	$R_{th}(ch-a)$ *	833	°C / W / TOTAL
		1042	°C / W / ELEMENT

\* Each terminal mounted on a recommended land.

● **Electrical characteristics** (Ta = 25°C)

<It is the same ratings for Tr1 and Tr2.>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	$I_{GSS}$	-	-	±10	μA	$V_{GS}=\pm 8V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR)DSS}$	50	-	-	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	$I_{DSS}$	-	-	1	μA	$V_{DS}=50V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(th)}$	0.3	-	1.0	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}$ *	-	1.6	2.2	Ω	$I_D=200mA, V_{GS}=4.5V$
		-	1.7	2.4		$I_D=200mA, V_{GS}=2.5V$
		-	1.9	2.7		$I_D=100mA, V_{GS}=1.8V$
		-	2.0	4.0		$I_D=40mA, V_{GS}=1.5V$
		-	2.4	7.2		$I_D=20mA, V_{GS}=1.2V$
Forward transfer admittance	$ Y_{fs} ^*$	0.4	-	-	S	$I_D=200mA, V_{DS}=10V$
Input capacitance	$C_{iss}$	-	25	-	pF	$V_{DS}=10V$
Output capacitance	$C_{oss}$	-	6	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	$C_{rss}$	-	3	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}$ *	-	4	-	ns	$I_D=100mA, V_{DD} \approx 30V$
Rise time	$t_r$ *	-	6	-	ns	$V_{GS}=4.5V$
Turn-off delay time	$t_{d(off)}$ *	-	15	-	ns	$R_L=300\Omega$
Fall time	$t_f$ *	-	55	-	ns	$R_G=10\Omega$

\*Pulsed

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

<It is the same ratings for Tr1 and Tr2.>

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

\*Pulsed

●Electrical characteristic curves

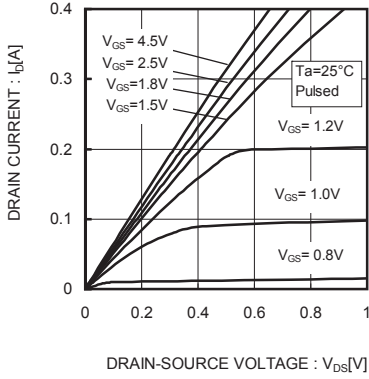


Fig.1 Typical Output Characteristics( I )

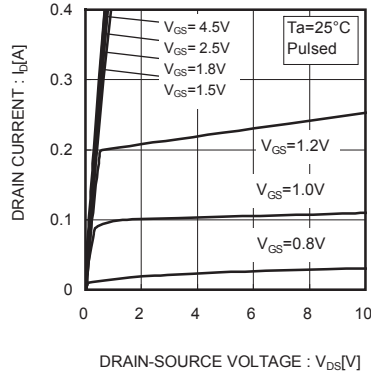


Fig.2 Typical Output Characteristics( II )

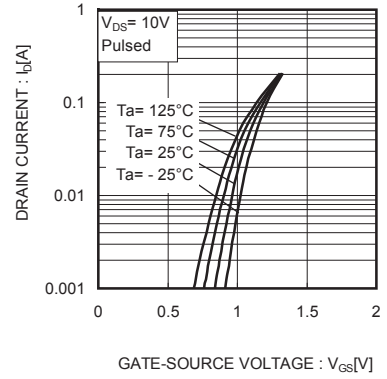


Fig.3 Typical Transfer Characteristics

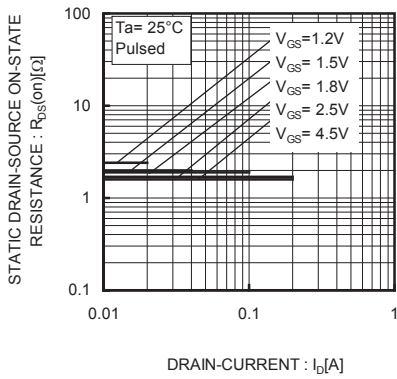


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current( I )

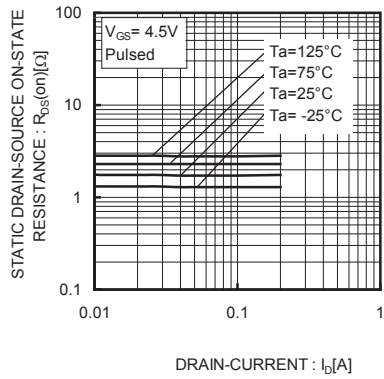


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current( II )

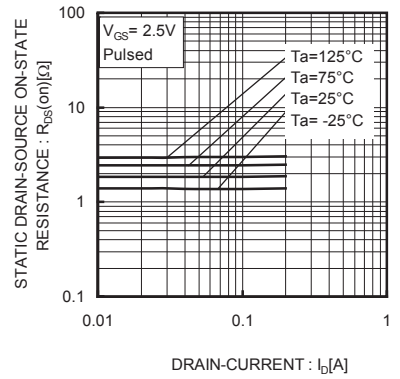


Fig.6 Static Drain-Source On-State Resistance vs. Drain Current( III )

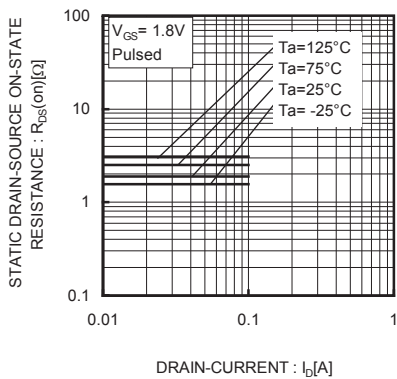


Fig.7 Static Drain-Source On-State Resistance vs. Drain Current( IV )

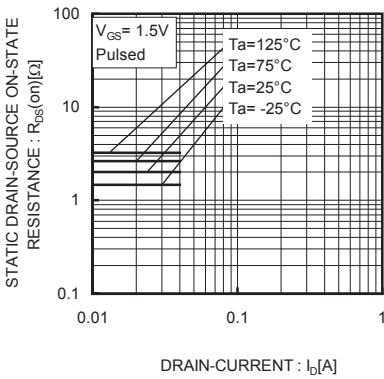


Fig.8 Static Drain-Source On-State Resistance vs. Drain Current( V )

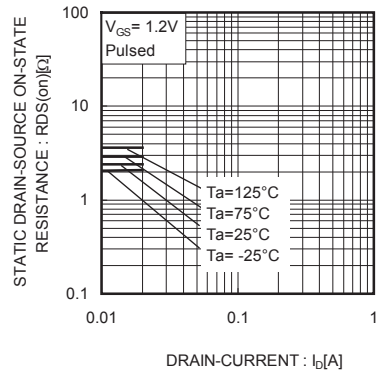


Fig.9 Static Drain-Source On-State Resistance vs. Drain Current( VI )

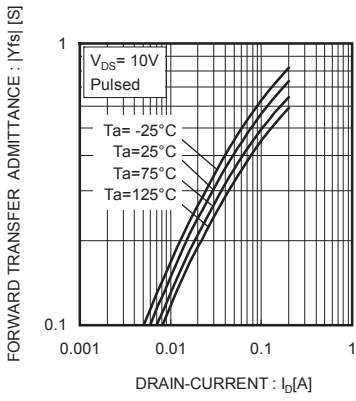


Fig.10 Forward Transfer Admittance vs. Drain Current

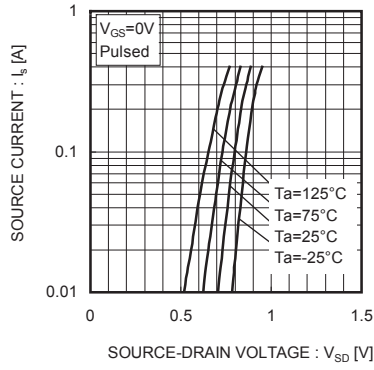


Fig.11 Reverse Drain Current vs. Source-Drain Voltage

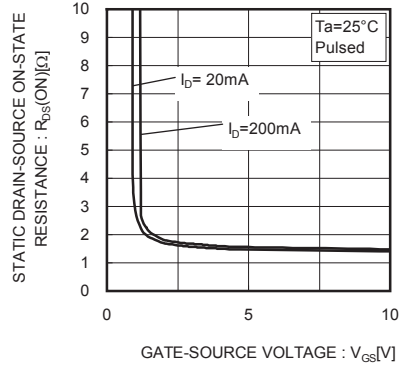


Fig.12 Static Drain-Source On-State Resistance vs. Gate Source Voltage

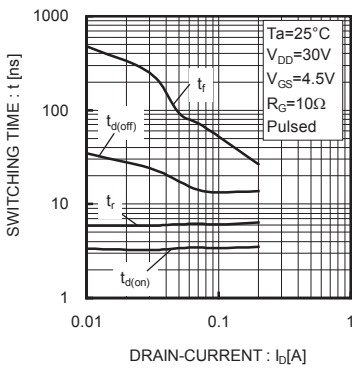


Fig.13 Switching Characteristics

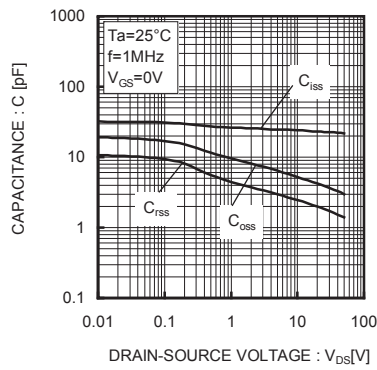


Fig.14 Typical Capacitance vs. Drain-Source Voltage

### ●Measurement circuits

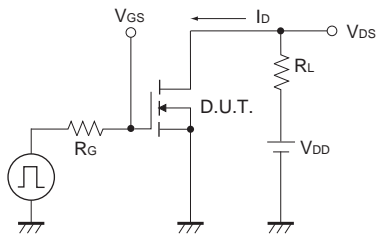


Fig.1-1 Switching time measurement circuit

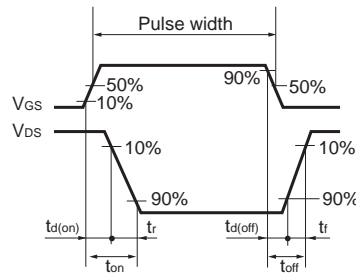


Fig.1-2 Switching waveforms

### ●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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