

Transistors

4V+2.5V Drive Nch+Pch MOSFET

US6M1

●Structure

Silicon N-channel / P-channel MOSFET

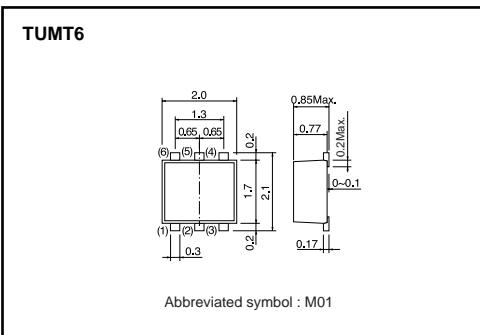
●Features

- 1) Low on-resistance.
- 2) Built-in G-S Protection Diode.
- 3) Small Surface Mount Package (TUMT6).

●Application

Power switching, DC / DC converter.

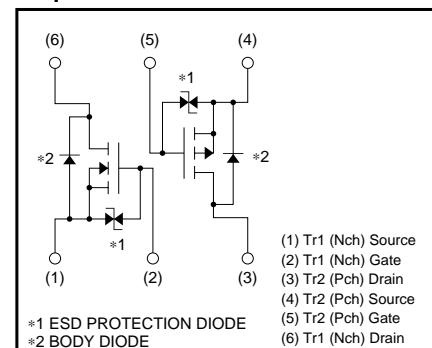
●Dimensions (Unit : mm)



●Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	3000
US6M1		○

●Equivalent circuit

●Absolute maximum ratings ($T_a=25^\circ\text{C}$)

Parameter	Symbol	Limits		Unit
		Tr1 : Nchannel	Tr2 : Pchannel	
Drain-source voltage	V_{DSS}	30	-20	V
Gate-source voltage	V_{GSS}	20	-12	V
Drain current	Continuous	I_D	± 1.4	A
	Pulsed	I_{DP}^*	± 5.6	A
Source current	Continuous	I_S	0.6	A
(Body diode)	Pulsed	I_{SP}^*	5.6	A
Total power dissipation	P_D^*	1		W / TOTAL
		0.7		W / ELEMENT
Channel temperature	T_{Ch}	150		°C
Storage temperature	T_{Stg}	-55 to +150		°C

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

*2 Mounted on a ceramic board.

●Thermal resistance

Parameter	Symbol	Limits	Unit
Channel to ambient	$R_{th} (\text{ch-a})^*$	125 179	°C / W / TOTAL °C / W / ELEMENT

*2 Mounted on a ceramic board.

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N-ch**●Electrical characteristics (Ta=25°C)**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	—	—	10	μA	$V_{GS}=20V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR) DSS}$	30	—	—	V	$I_D=1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS}=30V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(\text{th})}$	1.0	—	2.5	V	$V_{DS}=10V, I_D=1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	—	170	240	$m\Omega$	$I_D=1.4A, V_{GS}=10V$
		—	250	350		$I_D=1.4A, V_{GS}=4.5V$
		—	270	380		$I_D=1.4A, V_{GS}=4V$
Forward transfer admittance	$ Y_{fs} ^*$	1.0	—	—	S	$I_D=1.4A, V_{DS}=10V$
Input capacitance	C_{iss}	—	70	—	pF	$V_{DS}=10V$
Output capacitance	C_{oss}	—	15	—	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	—	12	—	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	—	6	—	ns	$I_D=0.7A, V_{DD}=15V$
Rise time	t_r^*	—	6	—	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	—	13	—	ns	$R_L=21\Omega$
Fall time	t_f^*	—	8	—	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	—	1.4	2.0	nC	$V_{DD}=15V \quad R_L=11\Omega$
Gate-source charge	Q_{gs}^*	—	0.6	—	nC	$V_{GS}=5V \quad R_G=10\Omega$
Gate-drain charge	Q_{gd}^*	—	0.3	—	nC	$I_D=1.4A$

*Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward voltage	V_{SD}	—	—	1.2	V	$I_S=0.6A, V_{GS}=0V$

Transistors

P-ch**●Electrical characteristics (Ta=25°C)**

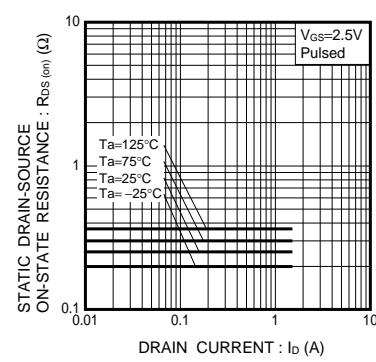
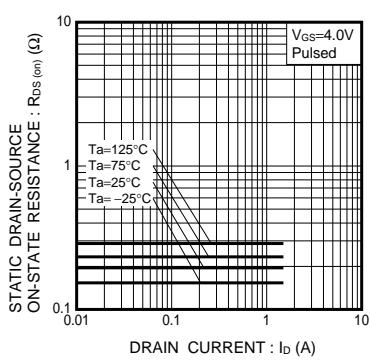
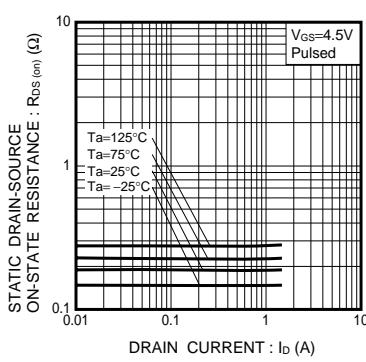
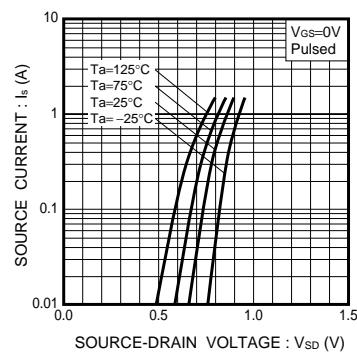
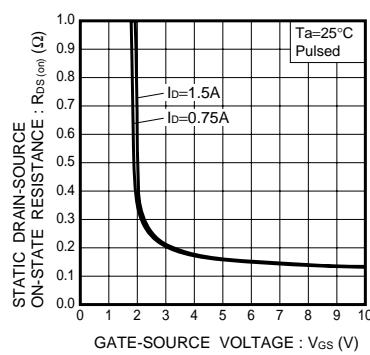
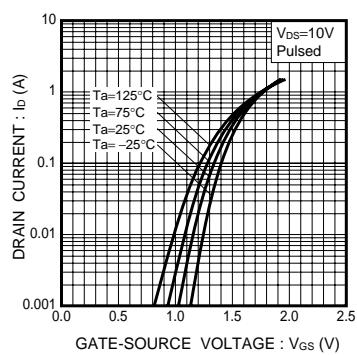
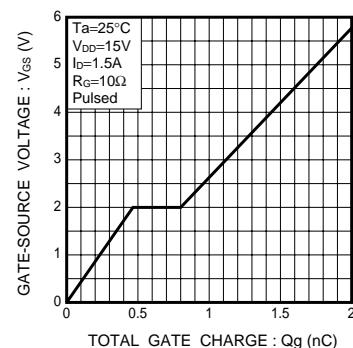
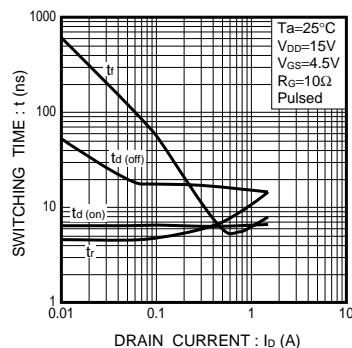
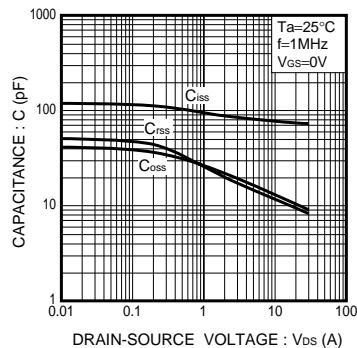
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	—	—	-10	μA	$V_{GS}=12V, V_{DS}=0V$
Drain-source breakdown voltage	$V_{(BR) DSS}$	-20	—	—	V	$I_D=-1mA, V_{GS}=0V$
Zero gate voltage drain current	I_{DSS}	—	—	-1	μA	$V_{DS}=-20V, V_{GS}=0V$
Gate threshold voltage	$V_{GS(\text{th})}$	-0.7	—	-2.0	V	$V_{DS}=-10V, I_D=-1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	—	280	390	$m\Omega$	$I_D=-1A, V_{GS}=-4.5V$
		—	310	430		$I_D=-1A, V_{GS}=-4V$
		—	570	800		$I_D=-0.5A, V_{GS}=-2.5V$
Forward transfer admittance	$ Y_{fs} ^*$	0.7	—	—	S	$I_D=-0.5A, V_{DS}=-10V$
Input capacitance	C_{iss}	—	150	—	pF	$V_{DS}=-10V$
Output capacitance	C_{oss}	—	20	—	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	—	20	—	pF	$f=1MHz$
Turn-on delay time	$t_d(\text{on})^*$	—	9	—	ns	$I_D=-0.5A, V_{DD}=-15V$
Rise time	t_r^*	—	8	—	ns	$V_{GS}=-4.5V$
Turn-off delay time	$t_d(\text{off})^*$	—	25	—	ns	$R_L=30\Omega$
Fall time	t_f^*	—	10	—	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	—	2.1	—	nC	$V_{DD}=-15V \quad R_L=15\Omega$
Gate-source charge	Q_{gs}^*	—	0.5	—	nC	$V_{GS}=-4.5V \quad R_G=10\Omega$
Gate-drain charge	Q_{gd}^*	—	0.5	—	nC	$I_D=-1A$

*Pulsed

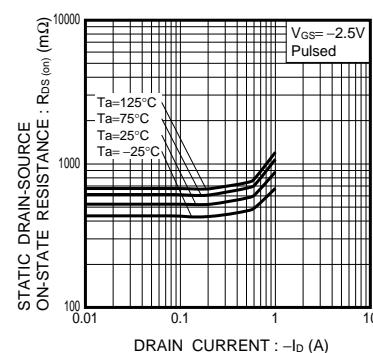
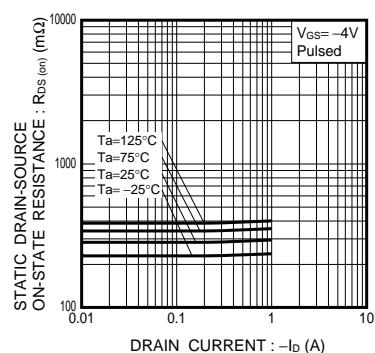
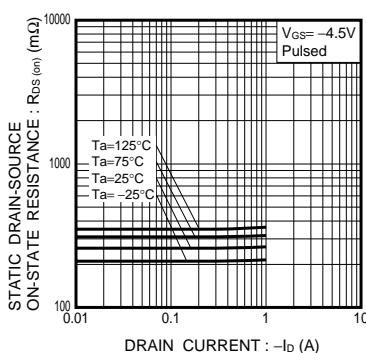
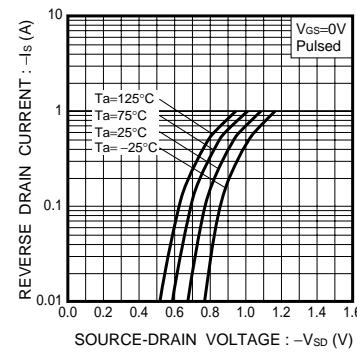
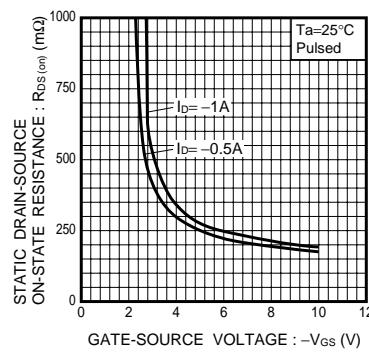
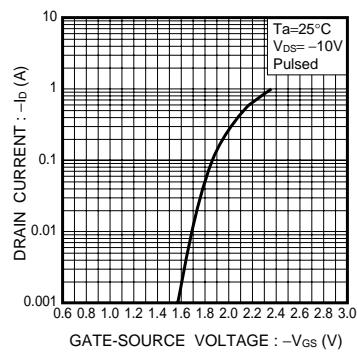
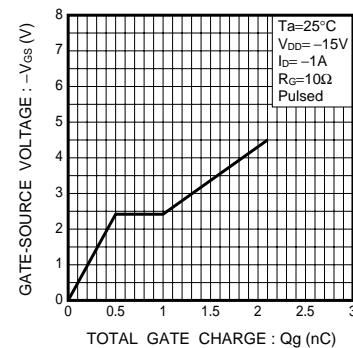
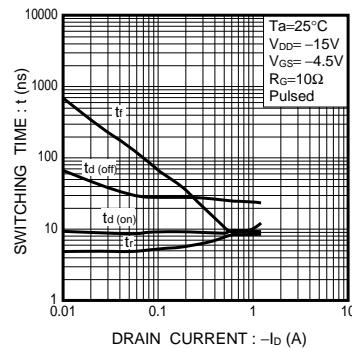
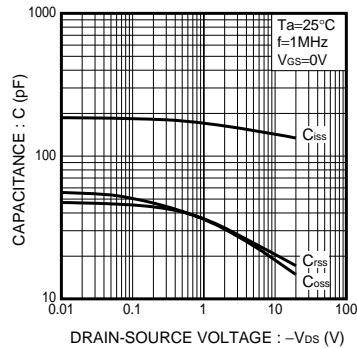
●Body diode characteristics (Source-Drain) (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward voltage	V_{SD}	—	—	-1.2	V	$I_S=-0.4A, V_{GS}=0V$

Transistors

N-ch**●Electrical characteristic curves**

Transistors

P-ch**●Electrical characteristic curves**

Transistors

N-ch

●Measurement circuit

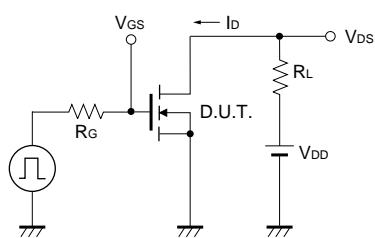


Fig.1-1 Switching Time Measurement Circuit

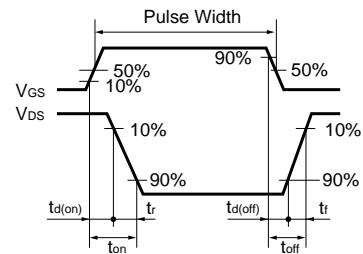


Fig.1-2 Switching Waveforms

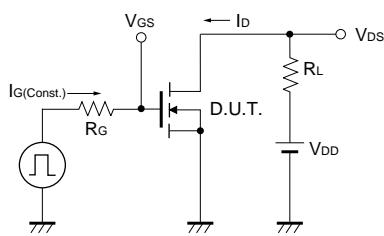


Fig.2-1 Gate Charge Measurement Circuit

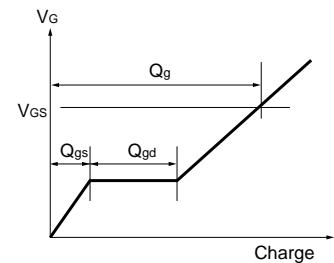


Fig.2-2 Gate Charge Waveform

Transistors

P-ch

●Measurement circuit

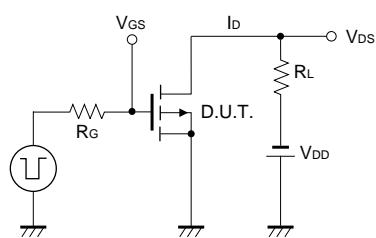


Fig.3-1 Switching Time Measurement Circuit

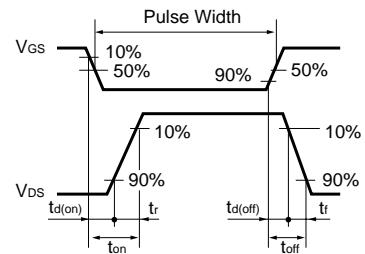


Fig.3-2 Switching Waveforms

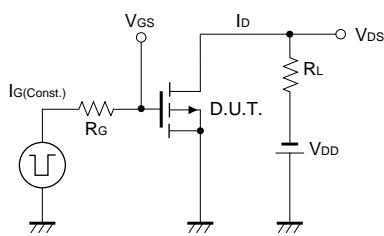


Fig.4-1 Gate Charge Measurement Circuit

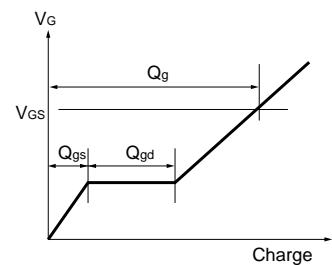


Fig.4-2 Gate Charge Waveform

Appendix

Notes

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- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
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- Работу по проектам и поставку образцов.
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- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
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