

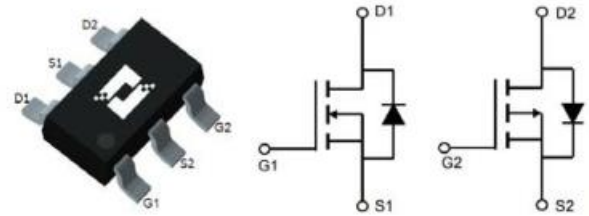
Features

- N+P Channel
- Very Low on-resistance
- SOT23-6L Package
- Pb-Free, RoHS Compliant

V_{DS}	30	-30	V
$R_{DS(on),TYP} @ V_{GS}=\pm 10V$	32	88	m Ω
$R_{DS(on),TYP} @ V_{GS}=\pm 4.5V$	40	110	m Ω
$I_{D Max}$	5	-2.6	A

Applications

- DC-DC Conversion Circuits
- Load/Power Switching with Level Shift
- Switching circuits
- Power supply converter


SOT23-6L
Order Information

Product	Package	Marking	Packing
DWL333C	SOT23-6L	3X	3000PCS/Reel

Absolute Maximum Ratings

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.

Symbol	Parameter		Rating		Unit
			NMOS	PMOS	
V _{GS}	Gate-Source Voltage		±16	±16	V
V _{(BR)DSS}	Drain-Source Breakdown Voltage		30	-30	V
T _{STG} T _J	Storage and operating temperature range		-55 to 150		°C
I _S	Diode Continuous Forward Current	T _A =25°C	1.8	-1.4	A
Mounted on Large Heat Sink					
I _{DM}	Pulse Drain Current Tested①	T _A =25°C	20	-10.4	A
I _D	Continuous Drain Current	T _A =25°C	5	-2.6	A
		T _A =70°C	4	-2.2	
P _D	Power dissipation for Dual Operation	T _A =25°C	1.56		W
		T _A =70°C	1		
R _{θJA}	Thermal Resistance Junction-Ambient		80		°C/W

N-Channel Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	30	–	–	V
I _{DSS}	Zero Gate Voltage Drain Current(T _A =25°C)	V _{DS} =30V, V _{GS} =0V	–	–	1	μA
	Zero Gate Voltage Drain Current(T _A =125°C)	V _{DS} =24V, V _{GS} =0V	–	–	100	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±16V, V _{DS} =0V	–	–	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.8	1.3	V
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =10V, I _D =4A	–	32	40	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =4.5V, I _D =3A	–	40	50	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =3.3V, I _D =2A	–	48	70	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	–	240	–	pF
C _{oss}	Output Capacitance		–	35	–	pF
C _{rss}	Reverse Transfer Capacitance		–	30	–	pF
Q _g	Total Gate Charge	V _{DS} =15V I _D =4A, V _{GS} =4.5V	–	3.1	–	nC
Q _{gs}	Gate Source Charge		–	0.4	–	nC
Q _{gd}	Gate Drain Charge		–	1.3	–	nC
Switching Characteristics						
t _{d(on)}	Turn on Delay Time	V _{DD} =15V, I _D =1A, R _G =3.3Ω, V _{GS} =10V	–	4.4	–	ns
t _r	Turn on Rise Time		–	2.6	–	ns
t _{d(off)}	Turn Off Delay Time		-	25.5	–	ns
t _f	Turn Off Fall Time		–	3.3	–	ns
Source Drain Diode Characteristics						
V _{SD}	Forward on voltage②	T _J =25°C, I _{SD} =4A, V _{GS} =0V	–	0.85	1.2	V

P-Channel Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =-250μA	-30	—	—	V
I _{DSS}	Zero Gate Voltage Drain Current(T _A =25°C)	V _{DS} =-30V, V _{GS} =0V	—	—	-1	μA
	Zero Gate Voltage Drain Current(T _A =125°C)	V _{DS} =-24V, V _{GS} =0V	—	—	-100	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±16V, V _{DS} =0V	—	—	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-0.5	-0.9	-1.3	V
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =-10, I _D =-2A	—	88	110	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =-4.5V, I _D =-2A	—	110	140	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =-3.3V, I _D =-1A	—	130	180	mΩ
Dynamic Electrical Characteristics @ T _J = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	—	215	—	pF
C _{oss}	Output Capacitance		—	40	—	pF
C _{rss}	Reverse Transfer Capacitance		—	30	—	pF
Q _g	Total Gate Charge	V _{DS} =-15V I _D =-2A, V _{GS} =-4.5V	—	3.3	—	nC
Q _{gs}	Gate Source Charge		—	0.4	—	nC
Q _{gd}	Gate Drain Charge		—	1.2	—	nC
Switching Characteristics						
t _{d(on)}	Turn on Delay Time	V _{DD} =-10V, I _D =-2A, R _G =3.3Ω, V _{GS} =-4.5V	—	10	—	ns
t _r	Turn on Rise Time		—	29	—	ns
t _{d(off)}	Turn Off Delay Time		-	23	—	ns
t _f	Turn Off Fall Time		—	38	—	ns
Source Drain Diode Characteristics						
V _{SD}	Forward on voltage②	T _J =25°C, I _{SD} =-1A, V _{GS} =0V	—	-0.84	-1.2	V

Notes: ① Pulse width limited by maximum allowable junction temperature

②Pulse test ; Pulse width≤300μs, duty cycle≤2%.

N Channel Typical Characteristics

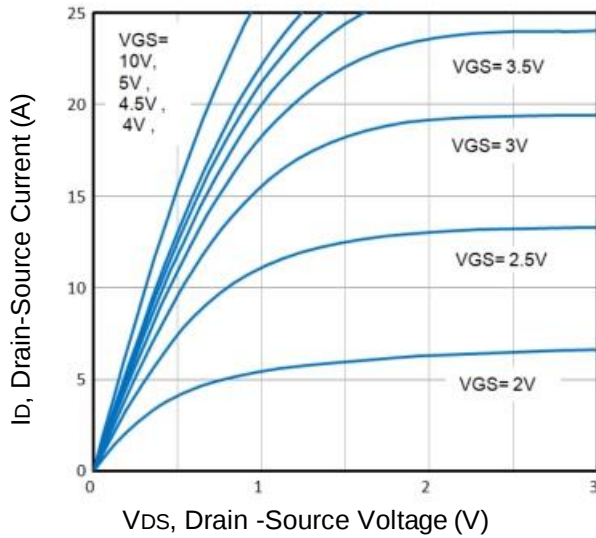


Fig1. Typical Output Characteristics

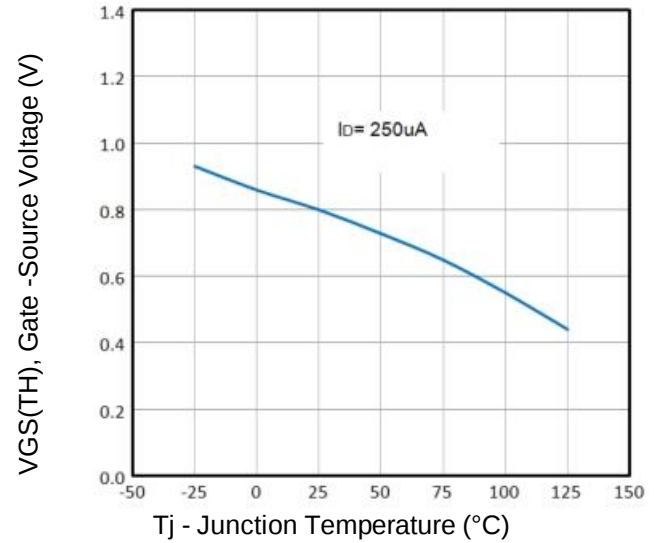


Fig2. Normalized Threshold Voltage Vs. Temperature

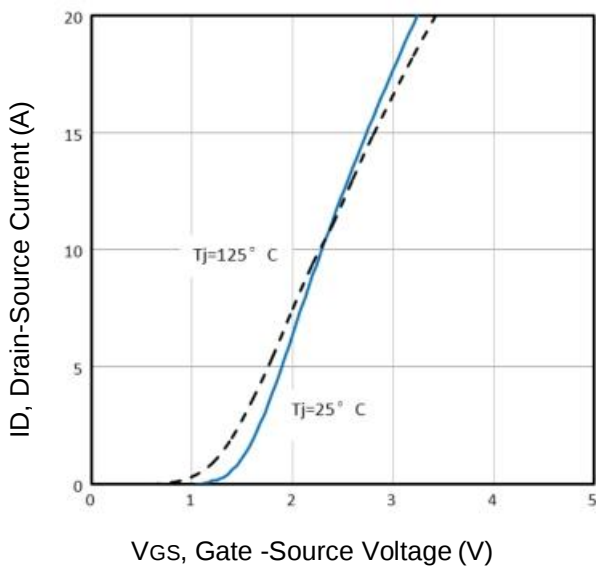


Fig3. Typical Transfer Characteristics

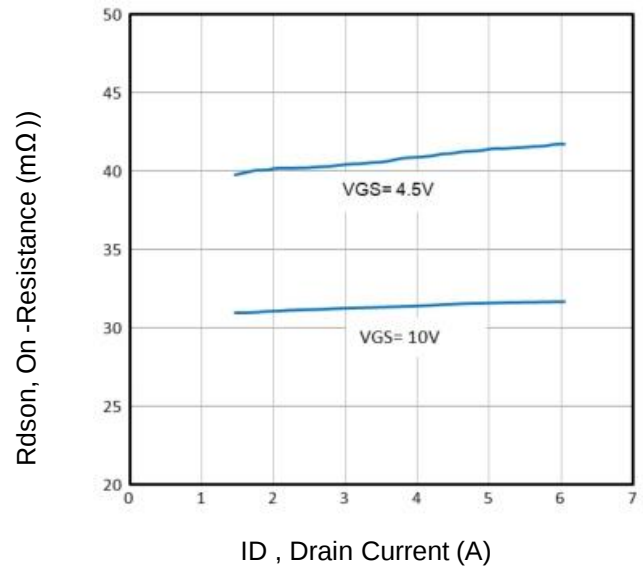


Fig4. On-Resistance vs. Drain Current and Gate

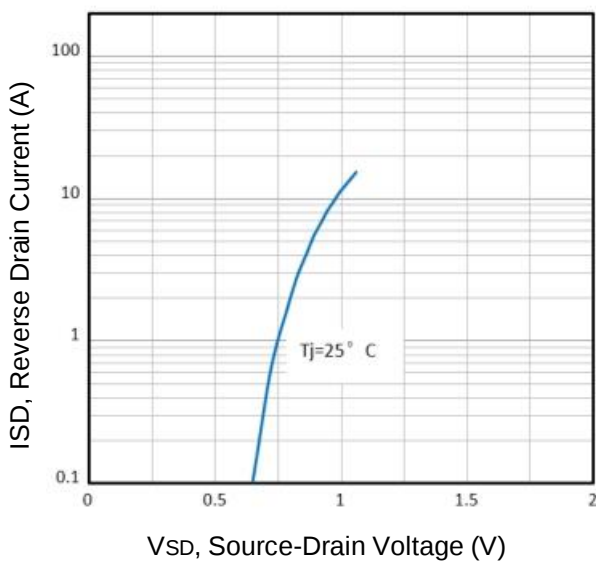


Fig5. Typical Source-Drain Diode Forward Voltage

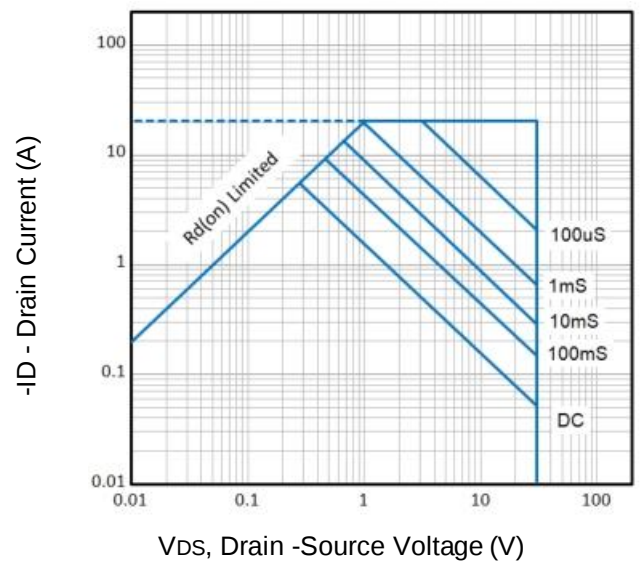


Fig6. Maximum Safe Operating Area

N Channel Typical Characteristics

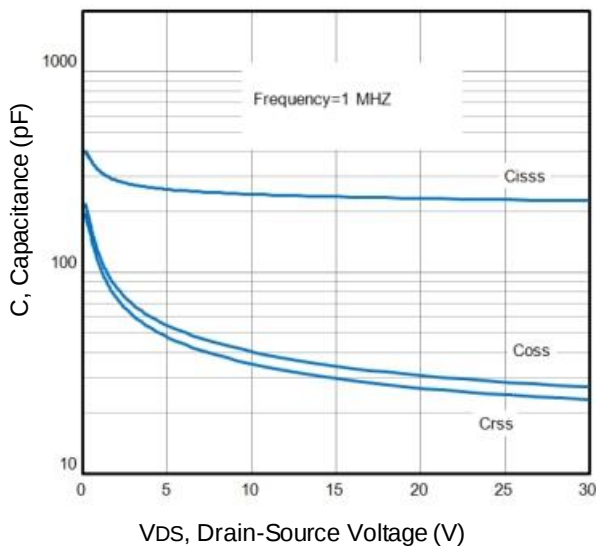


Fig7. Typical Capacitance Vs. Drain-Source Voltage

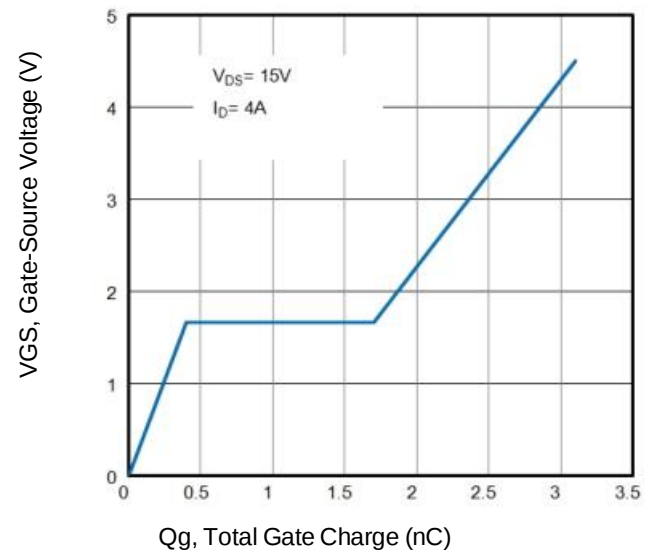


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

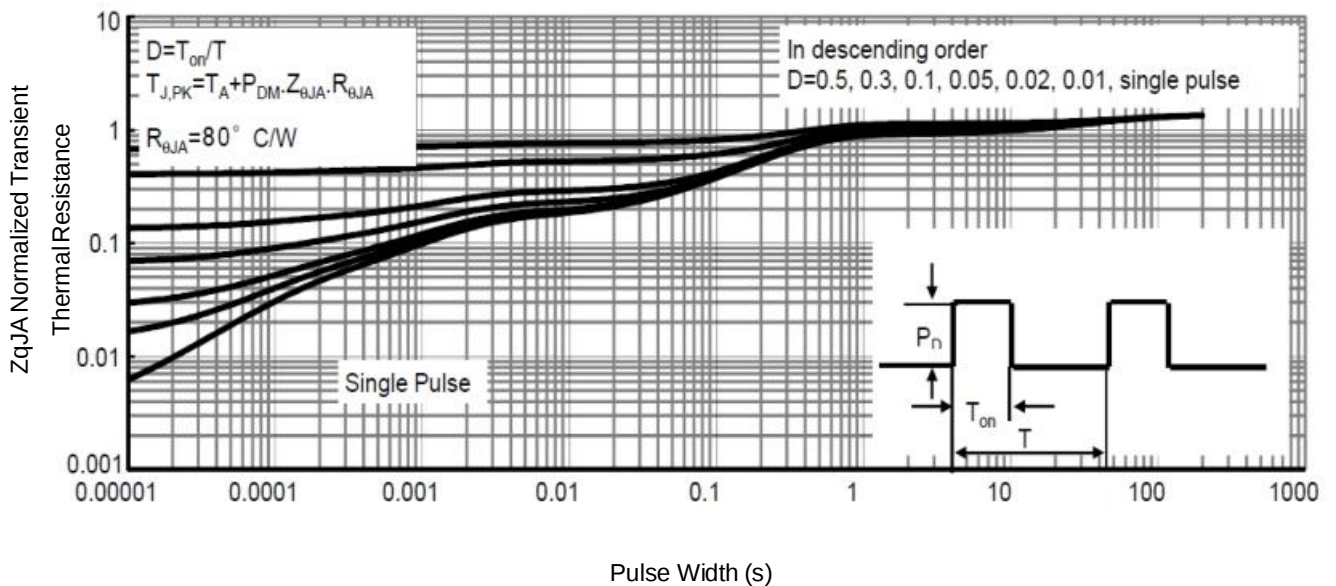


Fig9. Normalized Maximum Transient Thermal Impedance

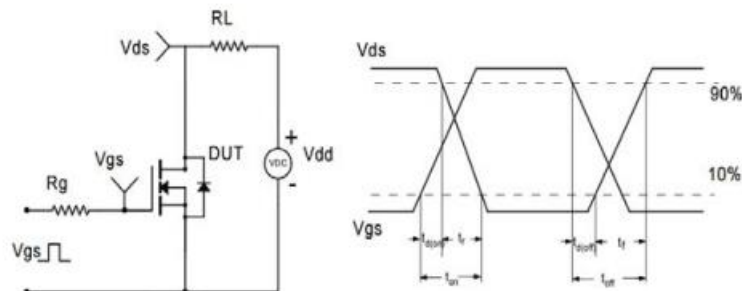


Fig10. Switching Time Test Circuit and waveforms

P Channel Typical Characteristics

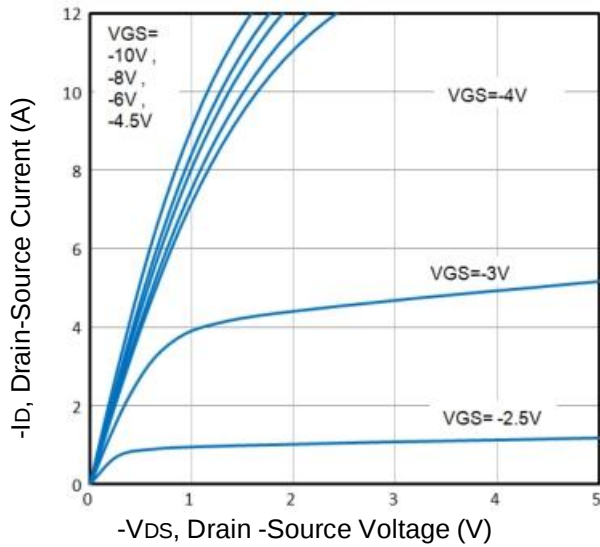


Fig11. Typical Output Characteristics

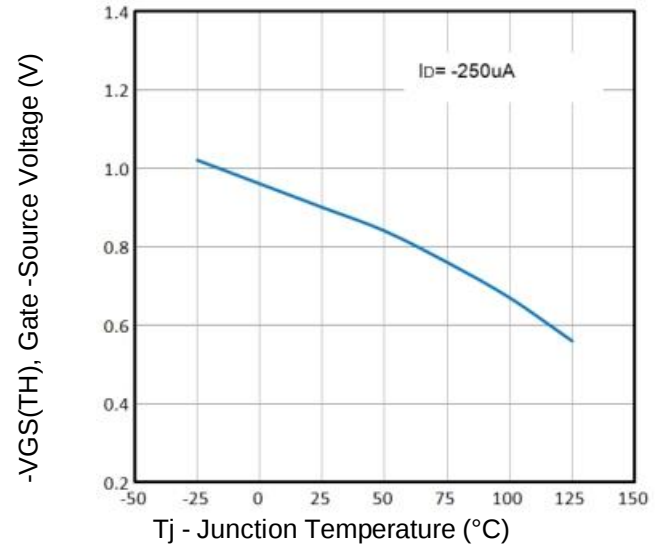


Fig12. Normalized Threshold Voltage Vs. Temperature

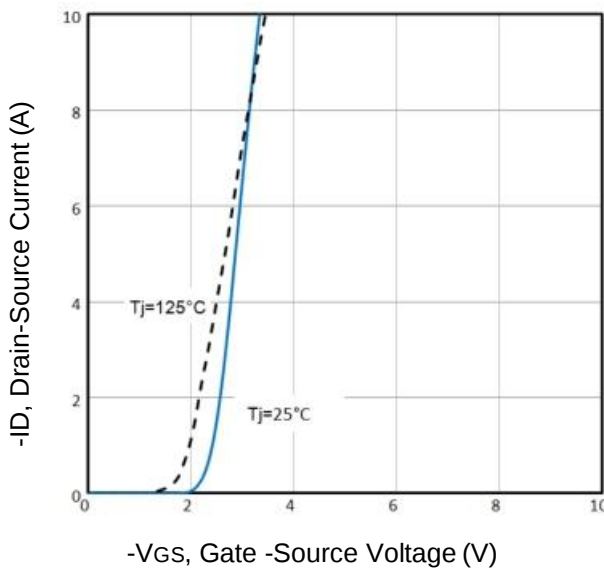


Fig13. Typical Transfer Characteristics

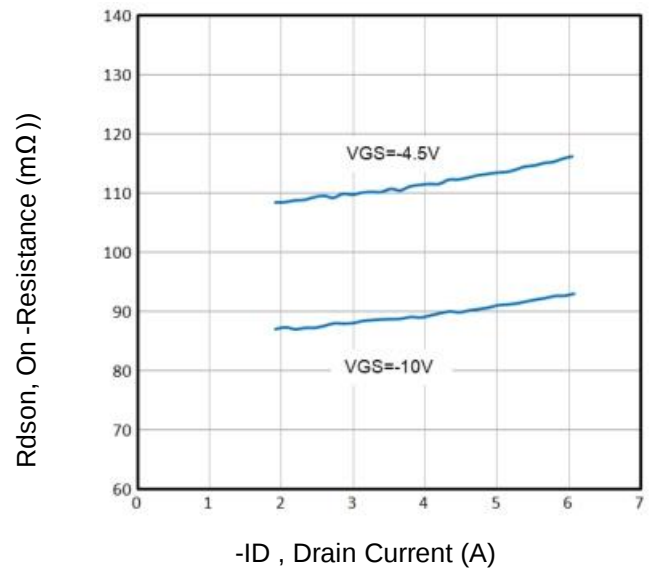


Fig14. On-Resistance vs. Drain Current and Gate

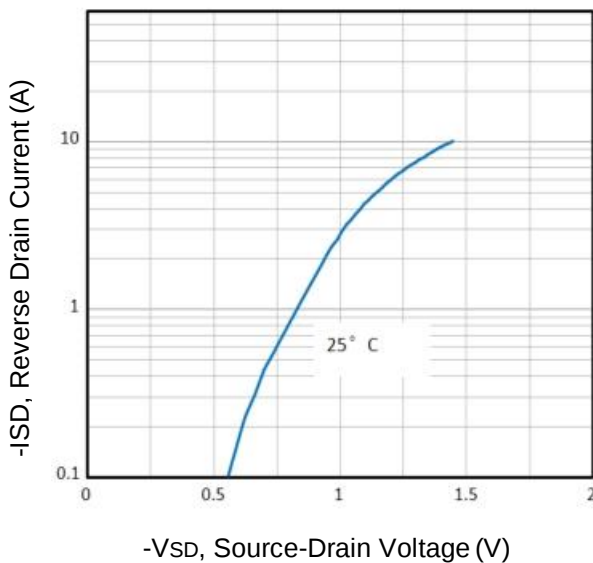


Fig15. Typical Source-Drain Diode Forward Voltage

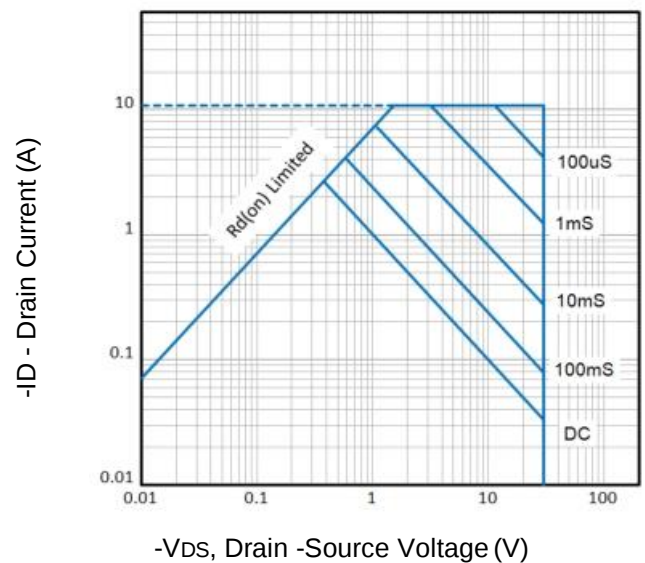


Fig16. Maximum Safe Operating Area

P Channel Typical Characteristics

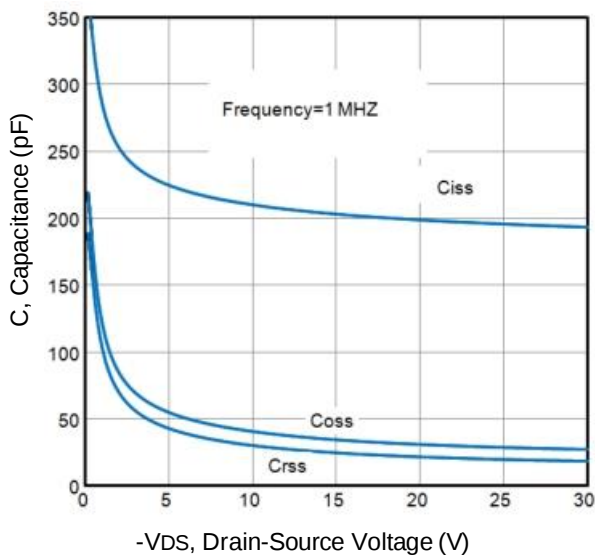


Fig17. Typical Capacitance Vs. Drain-Source Voltage

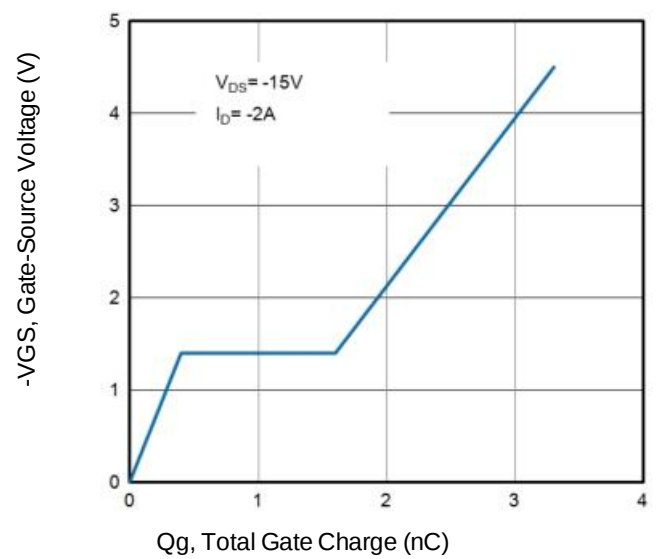


Fig18. Typical Gate Charge Vs. Gate-Source Voltage

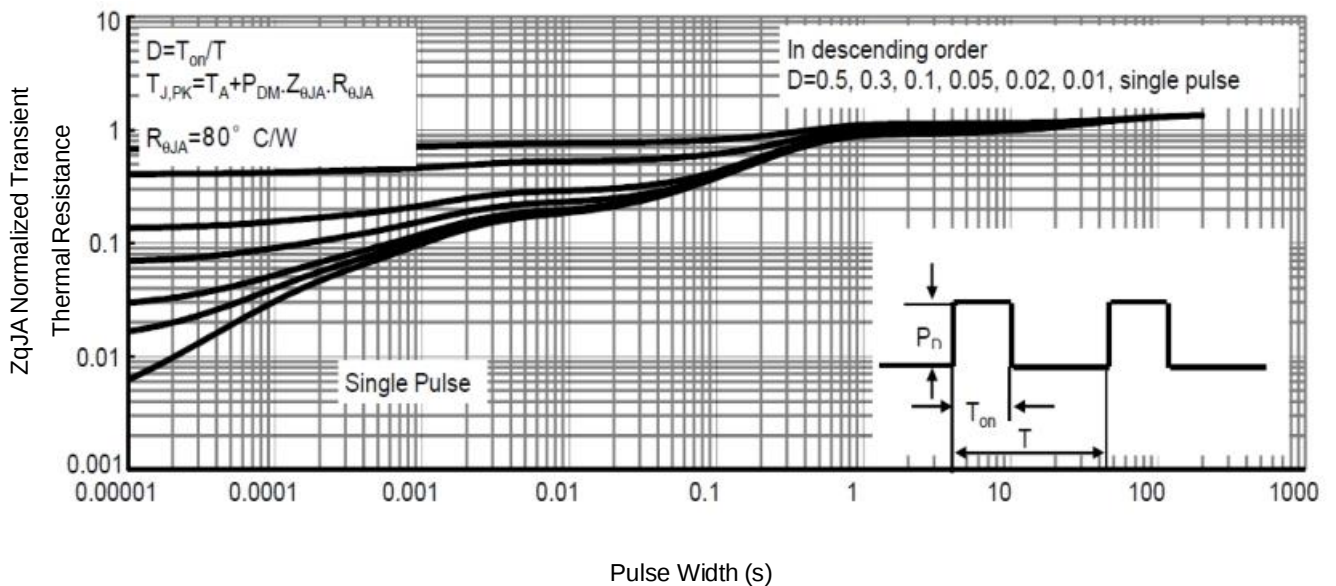


Fig19. Normalized Maximum Transient Thermal Impedance

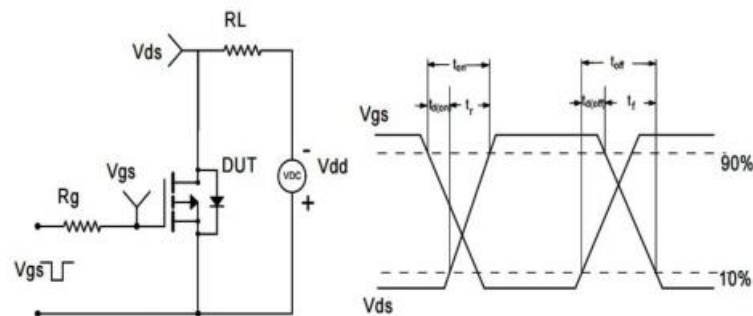
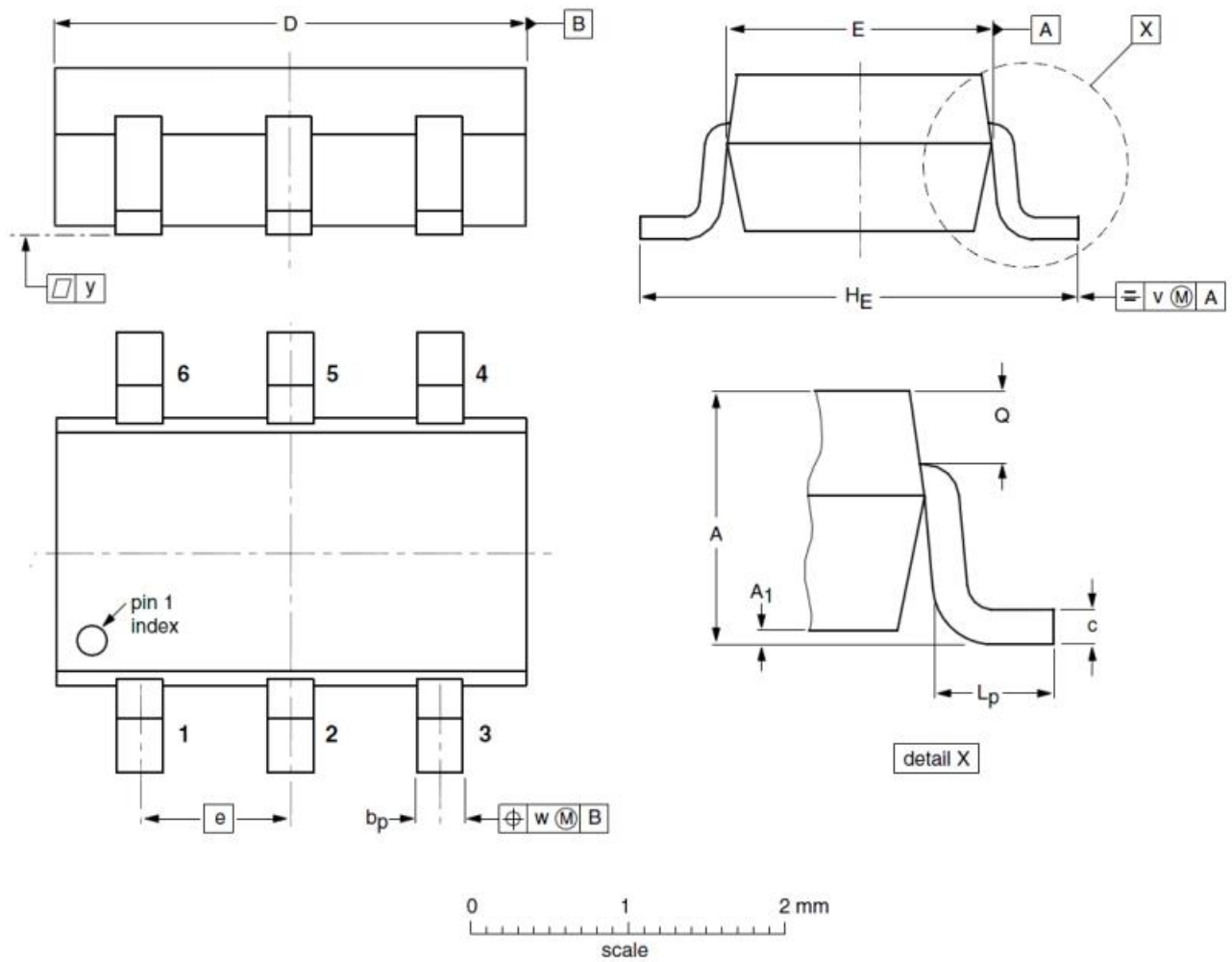


Fig20. Switching Time Test Circuit and waveforms

SOT23-6L Mechanical Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.90	1.10	1.25	A₁	0.01	0.05	0.10
b_p	0.25	0.35	0.40	c	0.10	0.18	0.26
D	2.70	2.92	3.10	E	1.30	1.60	1.70
e	--	0.95	--	H_E	2.50	2.80	3.00
L_p	0.20	0.38	0.60	Q	0.23	0.29	0.33
v	--	0.20	--	w	--	0.20	--
y	--	0.10					

Legal Disclaimer

The Dowell Technology given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Dowell Technology hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Dowell Technology Office (www.dowellsemi.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Dowell Technology Office. I Dowell Technology components may be used in life-support devices or systems only with the express written approval of Dowell Technology, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.