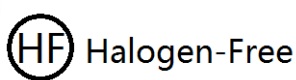


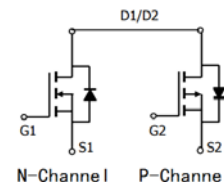
Features

- N+P Channel
- Enhancement mode
- Very low on-resistance
- Fast Switching
- Pb-free lead plating; RoHS compliant



Part ID	Package Type	Marking	Tape and reel information
VSD010C03MC	TO-252-4L	010C03MC	2500pcs/Reel

TO-252-4L



Absolute Maximum ratings, at $T_j=25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter		Rating		Unit
			NMOS	PMOS	
V _{GS}	Gate-Source Voltage		±20	±20	V
V _{(BR)DSS}	Drain-Source Breakdown Voltage		30	-30	V
T _{STG} T _J	Storage and operating temperature range		-55 to 175		°C
I _S	Diode Continuous Forward Current	T _C =25°C	30	-22	A
Mounted on Large Heat Sink					
I _{DM}	Pulse Drain Current Tested②	T _C =25°C	120	-88	A
I _D	Continuous Drain Current	T _C =25°C	30	-22	A
		T _C =100°C	19	-14	
P _D	Power dissipation for Dual Operation	T _C =25°C	25		W
R _{θJC}	Thermal Resistance-Junction to Case		6		°C/W
R _{θJA}	Thermal Resistance Junction-Ambient		45		°C/W
Drain-Source Avalanche Ratings					
EAS	Avalanche Energy, Single Pulsed		56③	72④	mJ

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	V _{DS} =30V,V _{GS} =0V	--	--	1	μA
	Zero Gate Voltage Drain Current(T _j =125°C)	V _{DS} =30V,V _{GS} =0V	--	--	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V,V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =250μA	1.0	1.6	2.5	V
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =10V, I _D =8A	--	10	13	mΩ
		V _{GS} =4.5V, I _D =6A	--	14	18	mΩ
Dynamic Electrical Characteristics @ T _j = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =25V,V _{GS} =0V, f=1MHz	--	880	--	pF
C _{oss}	Output Capacitance		--	110	--	pF
C _{rss}	Reverse Transfer Capacitance		--	95	--	pF
Q _g	Total Gate Charge	V _{DS} =15V,I _D =10A, V _{GS} =10V	--	18	--	nC
Q _{gs}	Gate Source Charge		--	3.8	--	nC
Q _{gd}	Gate Drain Charge		--	4.5	--	nC
Switching Characteristics						
t _{d(on)}	Turn on Delay Time	V _{DD} =15V, I _D =3.5A, R _G =3.3Ω, V _{GS} =10V	--	7	--	nS
t _r	Turn on Rise Time		--	14	--	nS
t _{d(off)}	Turn Off Delay Time		-	22	--	nS
t _f	Turn Off Fall Time		--	8	--	nS
Source Drain Diode Characteristics@ T _j = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _{SD} =10A,V _{GS} =0V	--	0.83	1.2	V
t _{rr}	Reverse Recovery Time	T _j =25°C ,I _{sd} =5A, V _{GS} =0V	--	13	--	nS
Q _{rr}	Reverse Recovery Charge	di/dt=-500A/μs	--	11	--	nC

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	V _{DS} =-30V,V _{GS} =0V	--	--	-1	μA
	Zero Gate Voltage Drain Current(T _j =125°C)	V _{DS} =-30V,V _{GS} =0V	--	--	-100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V,V _{DS} =0V	--	--	±100	nA
V _{GS(TH)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =-250μA	-1.0	-2.0	-2.5	V
R _{DS(ON)}	Drain-Source On-State Resistance②	V _{GS} =-10V, I _D =-6A	--	24	30	mΩ
		V _{GS} =-4.5V, I _D =-5A	--	40	50	mΩ
Dynamic Electrical Characteristics @ T _j = 25°C (unless otherwise stated)						
C _{iss}	Input Capacitance	V _{DS} =-25V,V _{GS} =0V, f=1MHz	--	950	--	pF
C _{oss}	Output Capacitance		--	115	--	pF
C _{rss}	Reverse Transfer Capacitance		--	105	--	pF
Q _g	Total Gate Charge	V _{DS} =-15V,I _D =-5A, V _{GS} =-10V	--	18	--	nC
Q _{gs}	Gate Source Charge		--	5	--	nC
Q _{gd}	Gate Drain Charge		--	4.2	--	nC
Switching Characteristics						
t _{d(on)}	Turn on Delay Time	V _{DD} =-15V, I _D =-5A, R _G =3.3Ω, V _{GS} =-10V	--	11	--	ns
t _r	Turn on Rise Time		--	39	--	ns
t _{d(off)}	Turn Off Delay Time		-	26	--	ns
t _f	Turn Off Fall Time		--	30	--	ns
Source Drain Diode Characteristics@ T _j = 25°C (unless otherwise stated)						
V _{SD}	Forward on voltage	I _{SD} =-6A,V _{GS} =0V	--	-0.85	-1.2	V
t _{rr}	Reverse Recovery Time	T _j =25°C ,I _{sd} =-5A, V _{GS} =0V	--	31	--	nS
Q _{rr}	Reverse Recovery Charge	di/dt=-2000A/μs	--	19	--	nC

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Pulse width ≤ 300μs; duty cycles ≤ 2%
- ③ Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} =15A, V_{GS} =10V. Part not recommended for use above this value
- ④ Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} =-17A, V_{GS} =-10V. Part not recommended for use above this value

N-Channel Typical Characteristics

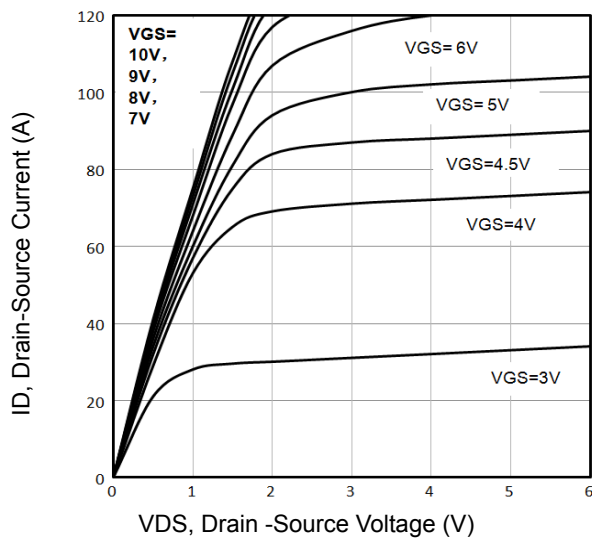


Fig1. Typical Output Characteristics

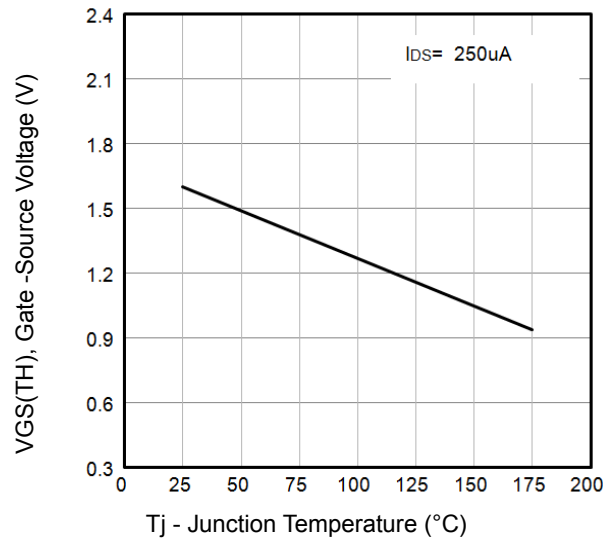


Fig2. $V_{GS(TH)}$ Gate-Source Voltage Vs. T_j

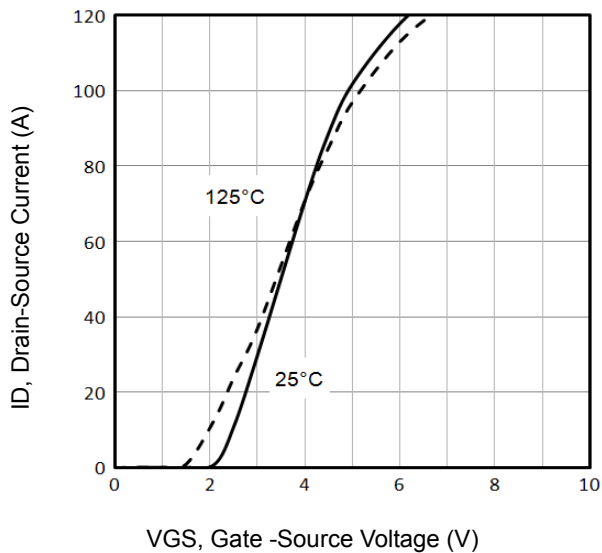


Fig3. Typical Transfer Characteristics

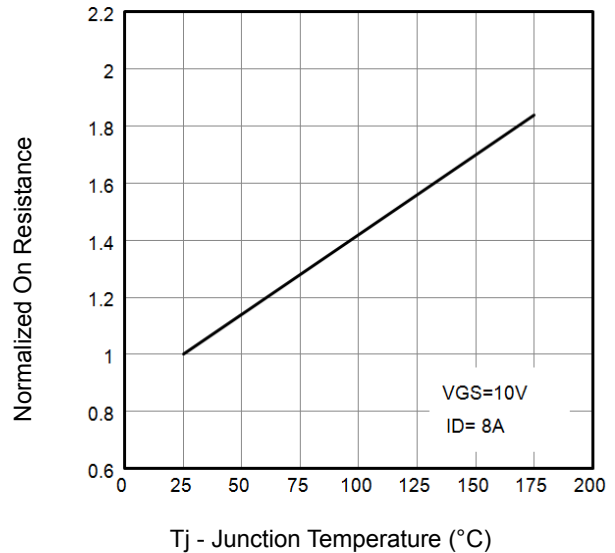


Fig4. Normalized On-Resistance Vs. T_j

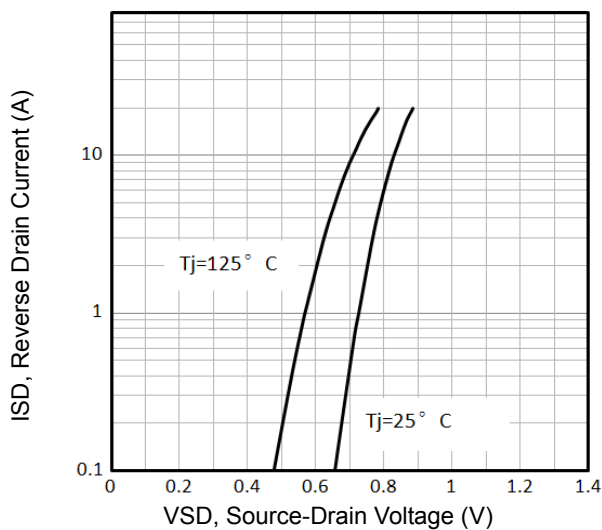


Fig5. Typical Source-Drain Diode Forward Voltage

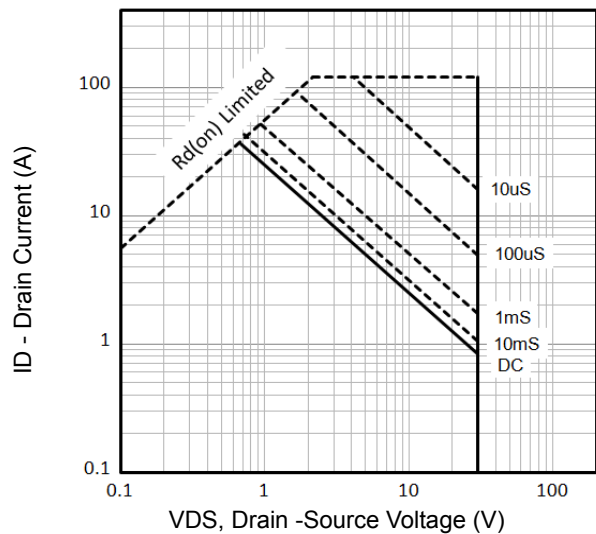


Fig6. Maximum Safe Operating Area

N-Channel Typical Characteristics

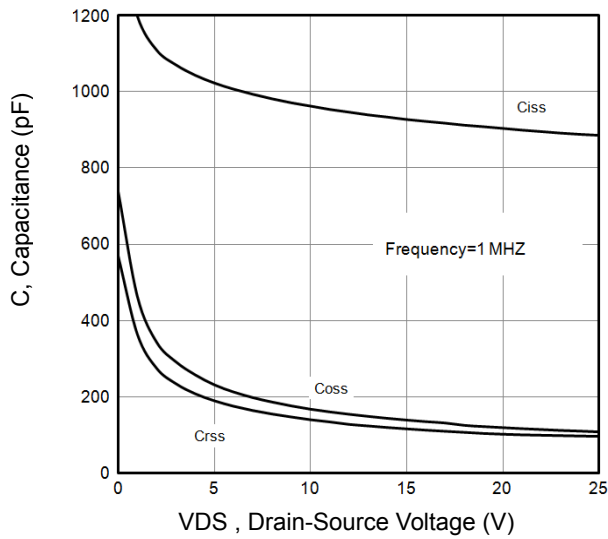


Fig7. Typical Capacitance Vs.Drain-Source Voltage

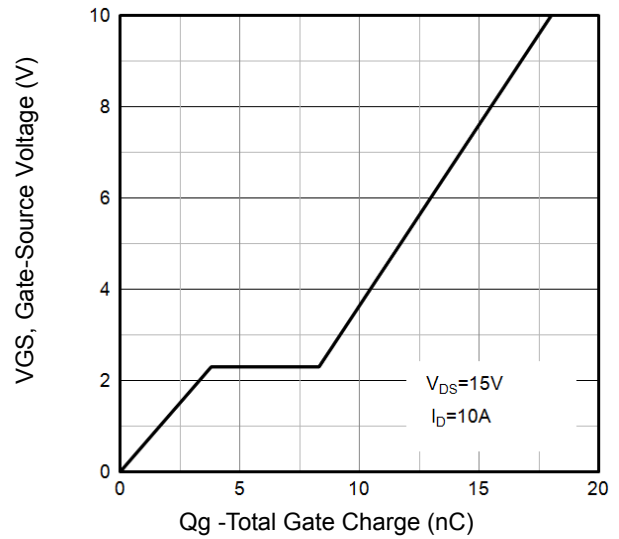


Fig8. Typical Gate Charge Vs.Gate-Source Voltage

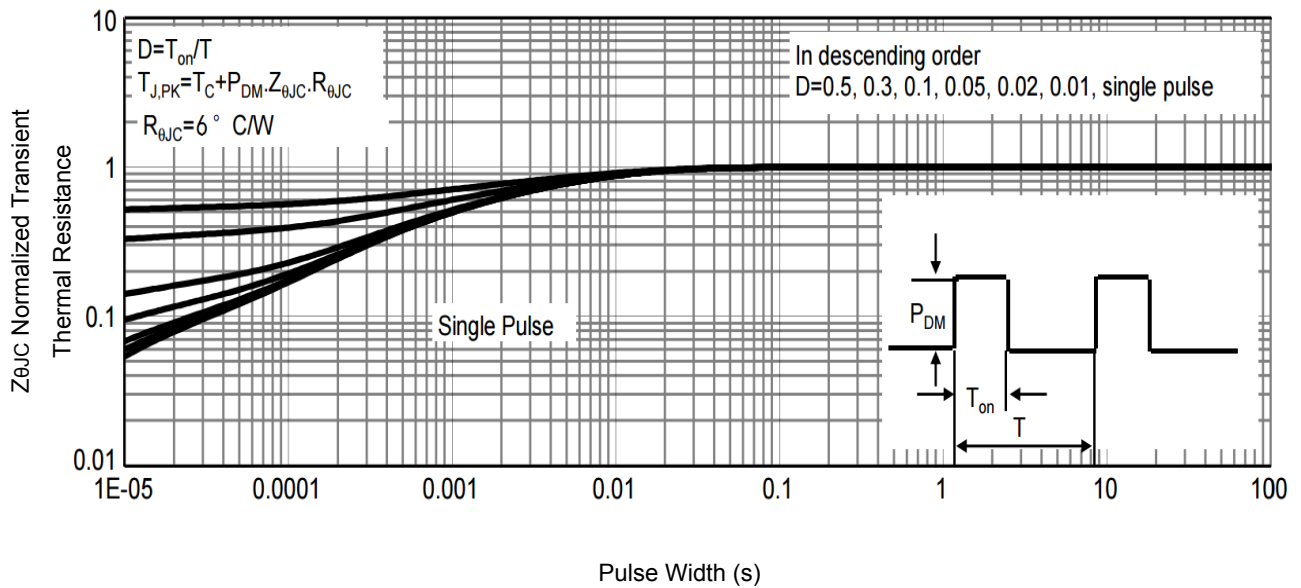


Fig9. Normalized Maximum Transient Thermal Impedance

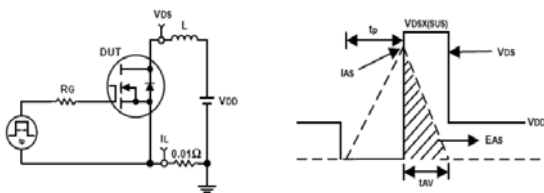


Fig10. Unclamped Inductive Test Circuit and waveforms

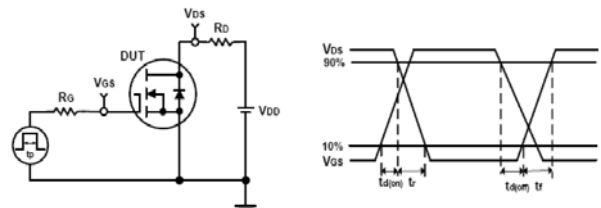


Fig11. Switching Time Test Circuit and waveforms

P-Channel Typical Characteristics

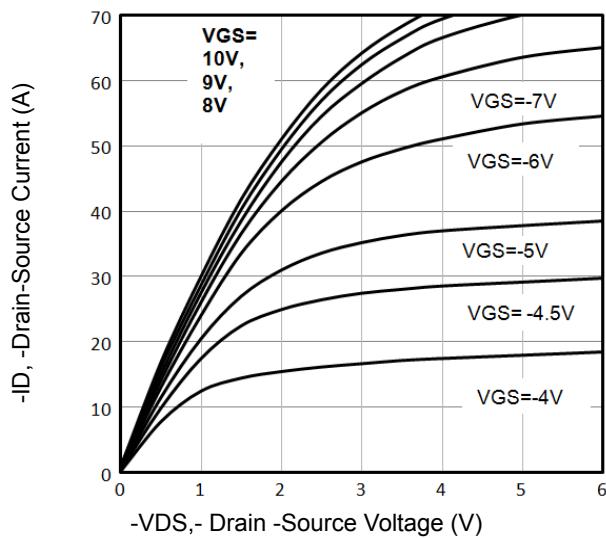


Fig1. Typical Output Characteristics

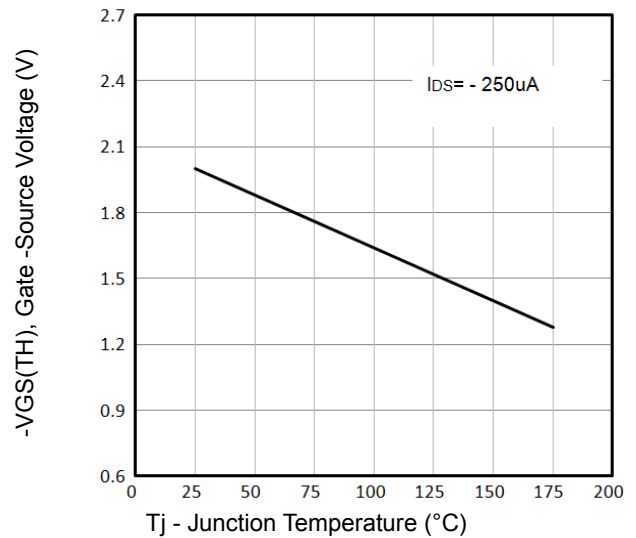


Fig2. $V_{GS(TH)}$ Gate -Source Voltage Vs. T_j

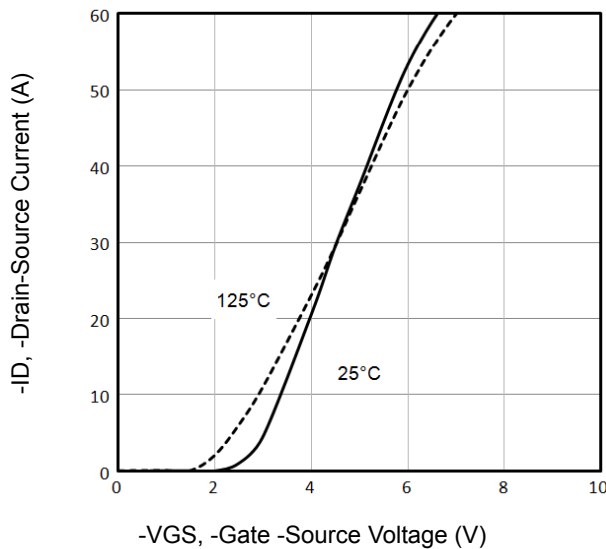


Fig3. Typical Transfer Characteristics

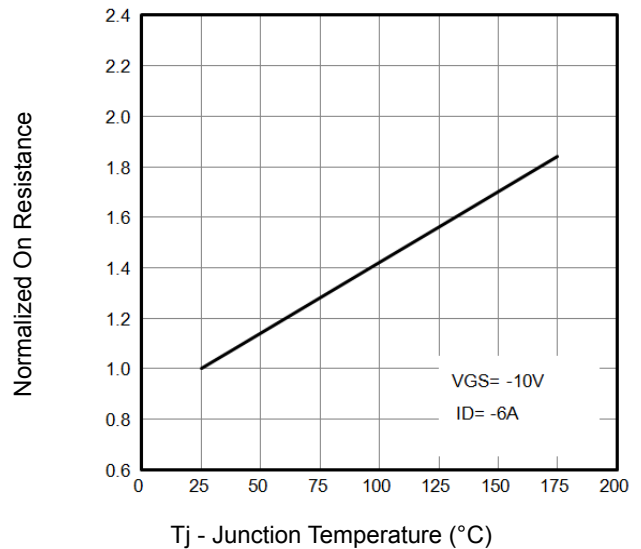


Fig4. Normalized On-Resistance Vs. T_j

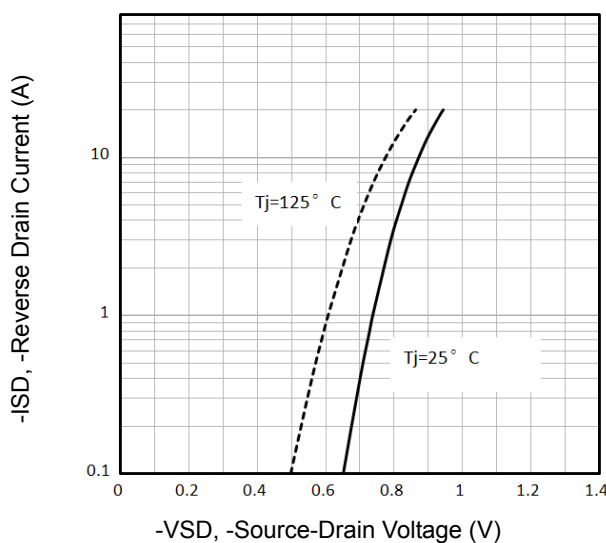


Fig5. Typical Source-Drain Diode Forward Voltage

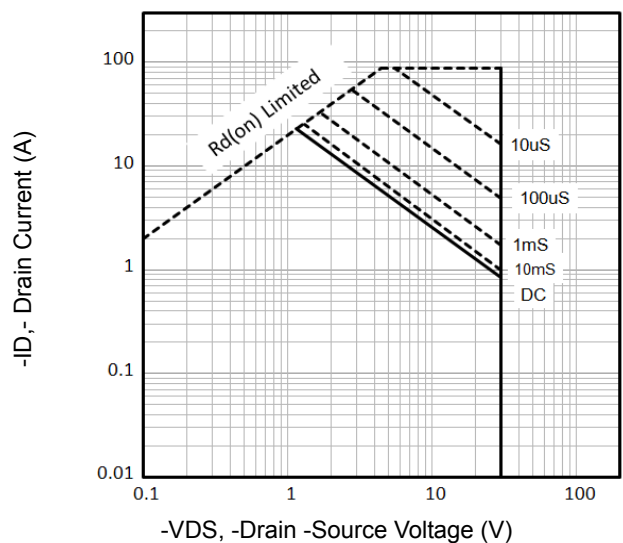
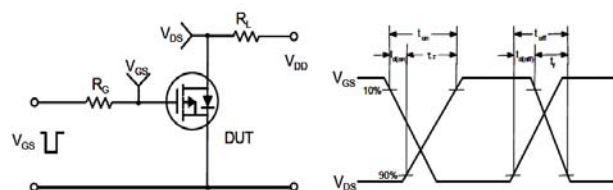
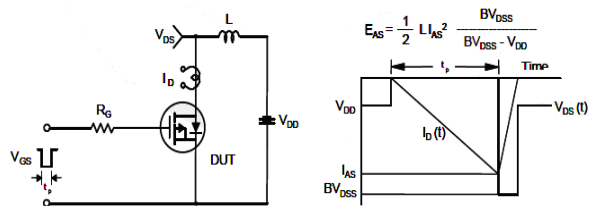
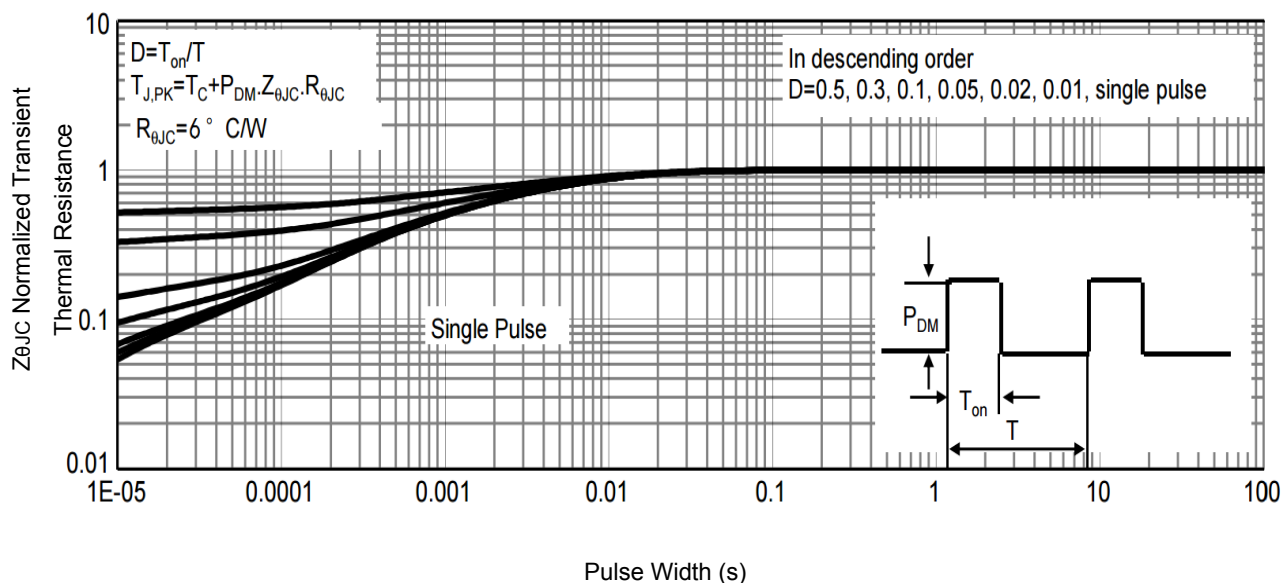
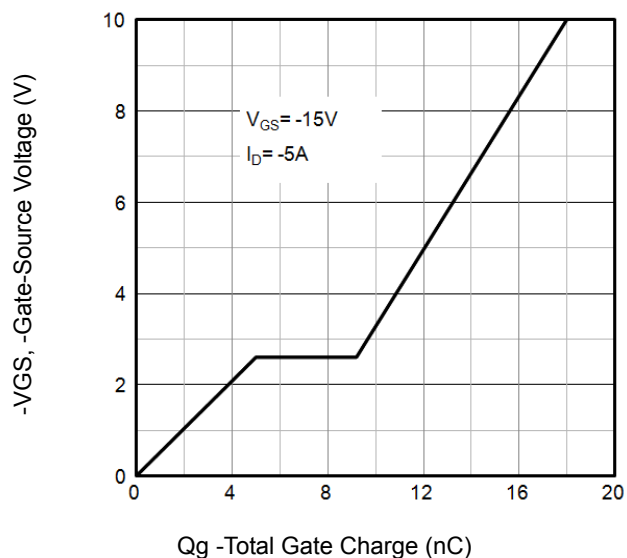
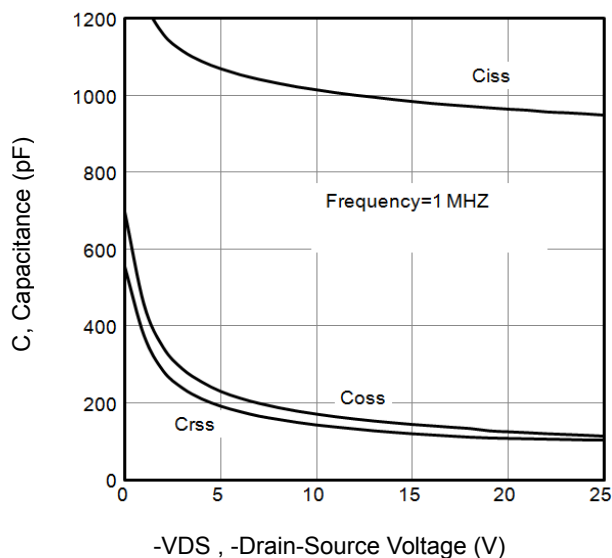
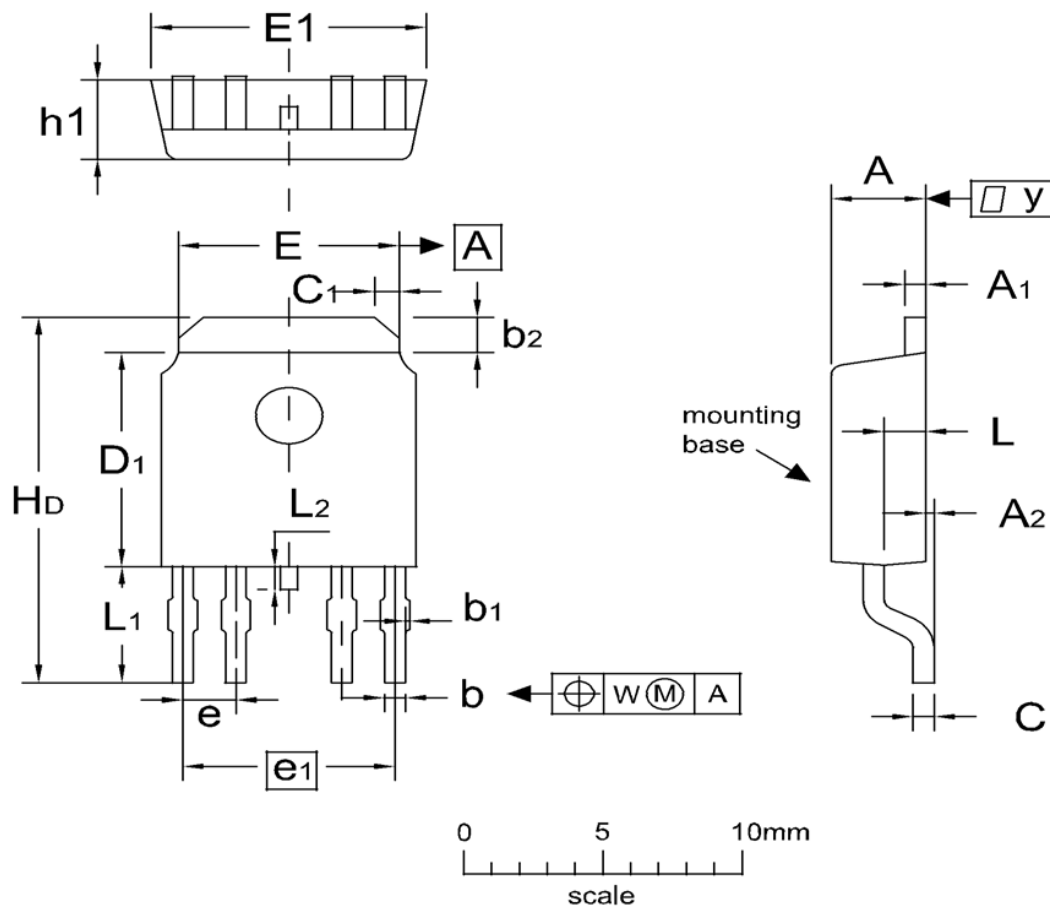


Fig6. Maximum Safe Operating Area

P-Channel Typical Characteristics



TO-252-4L Package Outline Data



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.1	2.3	2.5	A ₁	0.4	0.5	0.6
A2	--	--	0.3	b	0.4	0.5	0.6
b ₁	--	--	0.1	b ₂	0.8	1.0	1.2
C	0.4	0.5	0.6	C ₁	0.4	0.6	0.8
D ₁	5.7	6.1	6.5	E	5.0	5.3	5.6
E ₁	6.3	6.6	6.9	e	--	1.27	--
e ₁	--	5.08	--	H _D	9.6	10.0	10.4
h ₁	2.1	2.3	2.5	L	0.80	1.0	1.2
L ₁	2.6	2.9	3.2	L ₂	0.35	0.65	0.95

Customer Service

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