

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D	$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
20V	300mΩ@4.5V	0.8A	-20V	850mΩ@-4.5V	-0.5A
	400mΩ@2.5V			1200mΩ@-2.5V	
	950mΩ@1.8V			2000mΩ@-1.8V	

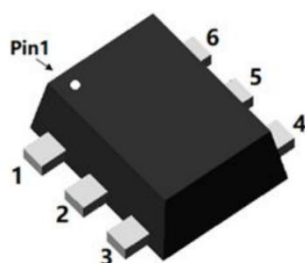
Feature

- Trench Power LV MOSFET technology
- High density cell design for Low RDS(ON)
- High Speed switching
- ESD protected
- Suffix "-Q1" for AEC-Q101

Application

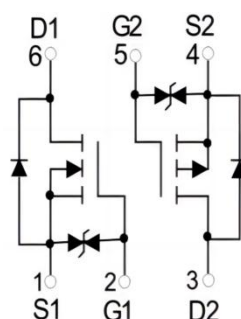
- Interfacing, Logic switch
- Load switch
- Power management

Package



SOT-563

Circuit diagram



Marking



Absolute maximum ratings ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	20	-20	V
Gate-Source Voltage	V_{GS}	± 10	± 10	V
Continuous Drain Current	I_D	0.8	-0.5	A
Continuous Drain Current ($T_A=100^{\circ}\text{C}$)	$I_D(100^{\circ}\text{C})$	0.5	-0.3	A
Pulsed Drain Current ¹⁾	I_{DM}	3	-2	A
Power Dissipation ²⁾	P_D	0.31	0.28	W
Thermal Resistance Junction to Ambient ³⁾	$R_{\theta JA}$	403	446	$^{\circ}\text{C/W}$
Operating Junction Temperature	T_J	$-55 \sim +150$	$-55 \sim +150$	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	$-55 \sim +150$	$-55 \sim +150$	$^{\circ}\text{C}$

N-CH Electrical characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	20			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =20V, V _{GS} =0V			1	μA
Gate-body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±10V			±10	μA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	0.35	0.75	1.1	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =4.5V, I _D =0.5A		185	300	mΩ
		V _{GS} =2.5V, I _D =0.4A		267	400	
		V _{GS} =1.8V, I _D =0.2A		438	950	
Dynamic characteristics ⁴⁾						
Input Capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V, f =1MHz		29		pF
Output Capacitance	C _{oss}			11		
Reverse Transfer Capacitance	C _{rss}			5.4		
Total Gate Charge	Q _g	V _{DS} =10V, V _{GS} =10V, I _D =0.5A		2.17		nC
Gtae-Source Charge	Q _{gs}			0.25		
Gtae-Drain Charge	Q _{gd}			0.23		
Turn-on delay time	t _{d(on)}	V _{DS} =10V, V _{GS} =10V, I _D =0.5A R _G =3Ω		2		nS
Turn-on rise time	t _r			17		
Turn-off delay time	t _{d(off)}			14		
Turn-off fall time	t _f			26		
Source-Drain Diode characteristics						
Diode Forward Current	I _S				0.8	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _S =0.8A			1.2	V
Reverse Recovery Time	T _{rr}	I _F =0.5A, di/dt =100A/μs		12		nS
Reverse Recovery Charge	Q _{rr}			0.6		nC

P-CH Electrical characteristics (T_J=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =-250μA	-20			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-20V, V _{GS} =0V			-1	μA
Gate-body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±10V			±10	μA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.35	-0.62	-1.2	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =-4.5V, I _D =-0.5A		600	850	mΩ
		V _{GS} =-2.5V, I _D =-0.3A		850	1200	
		V _{GS} =-1.8V, I _D =-0.2A		1300	2000	
Dynamic characteristics ⁴⁾						
Input Capacitance	C _{iss}	V _{DS} =-10V, V _{GS} =0V, f =1MHz		37		pF
Output Capacitance	C _{oss}			12		
Reverse Transfer Capacitance	C _{rss}			6		
Total Gate Charge	Q _g	V _{DS} =-10V, V _{GS} =-10V I _D =-0.5A		2.55		nC
Gtae-Source Charge	Q _{gs}			0.35		
Gtae-Drain Charge	Q _{gd}			0.31		
Turn-on delay time	t _{d(on)}	V _{DS} =-10V, V _{GS} =-10V I _D =-0.5A, R _G =3Ω		3		nS
Turn-on rise time	t _r			18		
Turn-off delay time	t _{d(off)}			20		
Turn-off fall time	t _f			27		
Source-Drain Diode characteristics						
Diode Forward Current	I _S				-0.5	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _S =-0.5A			-1.2	V
Reverse Recovery Time	T _{rr}	I _F =-0.5A, di/dt =-100A/μs		18		nS
Reverse Recovery Charge	Q _{rr}			12		nC

Notes:

- 1) Repetitive rating; pulse width limited by max. junction temperature.
- 2) Pd is based on max. junction temperature, using junction-case thermal resistance.
- 3) The value of R_{θJA} is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in the still air environment with T_A = 25°C. The maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.
- 4) Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

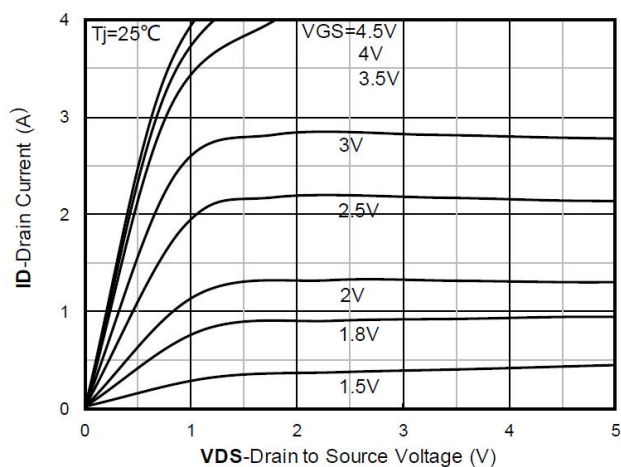


Figure 1. Output Characteristics

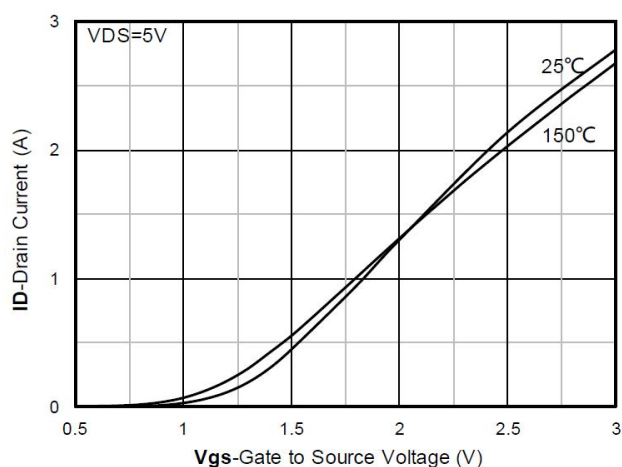


Figure 2. Transfer Characteristics

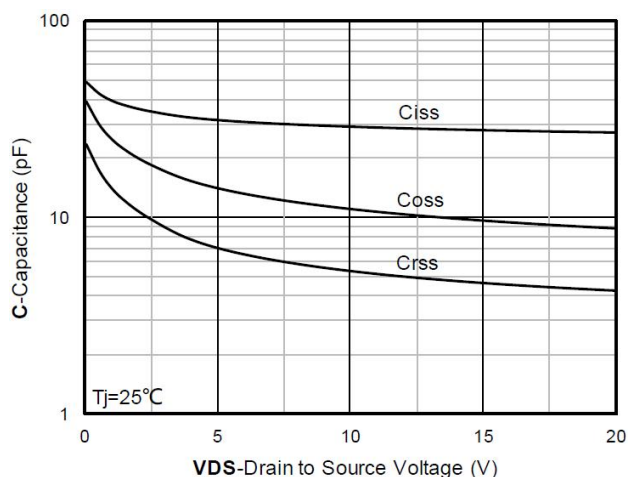


Figure 3. Capacitance Characteristics

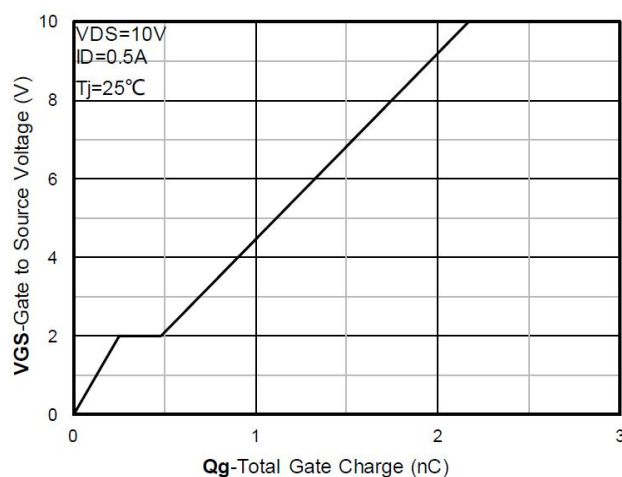


Figure 4. Gate Charge

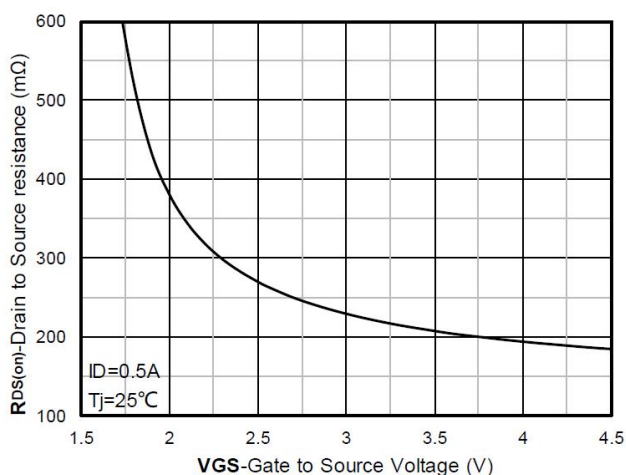


Figure 5. On-Resistance vs Gate to Source Voltage

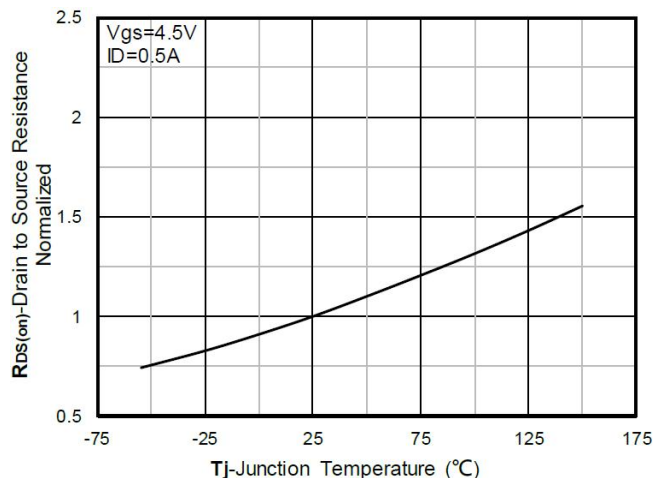


Figure 6. Normalized On-Resistance

N-Channel Typical Characteristics

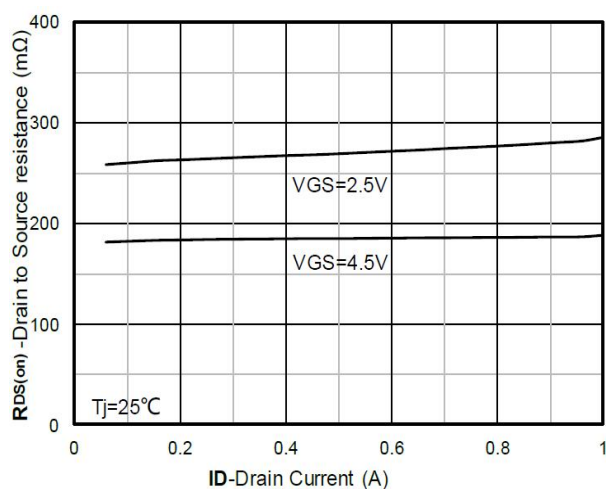


Figure 7. $R_{DS(on)}$ VS Drain Current

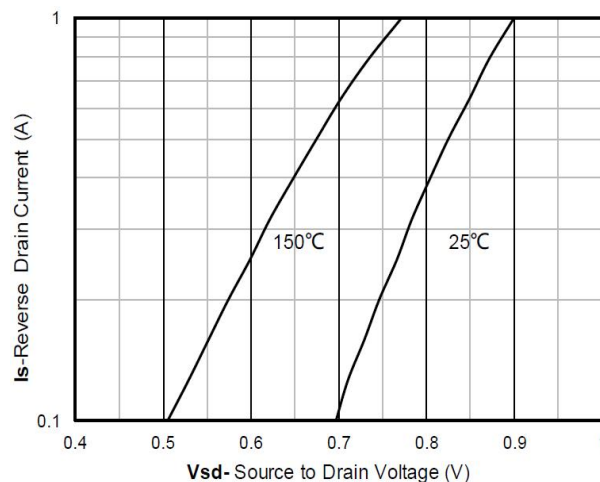


Figure 8. Forward characteristics of reverse diode

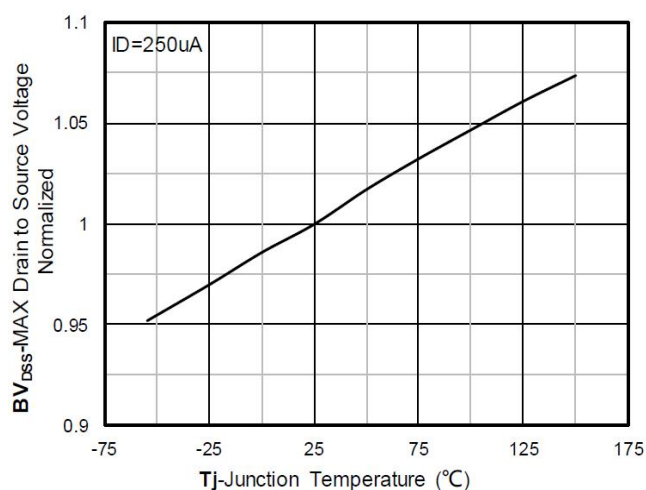


Figure 9. Normalized breakdown voltage

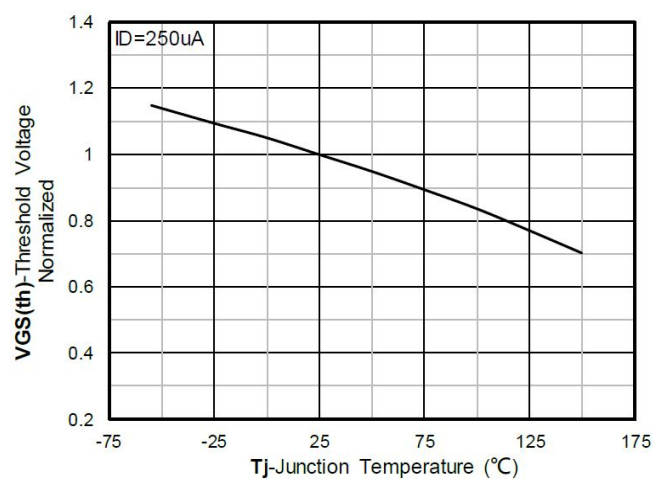


Figure 10. Normalized Threshold voltage

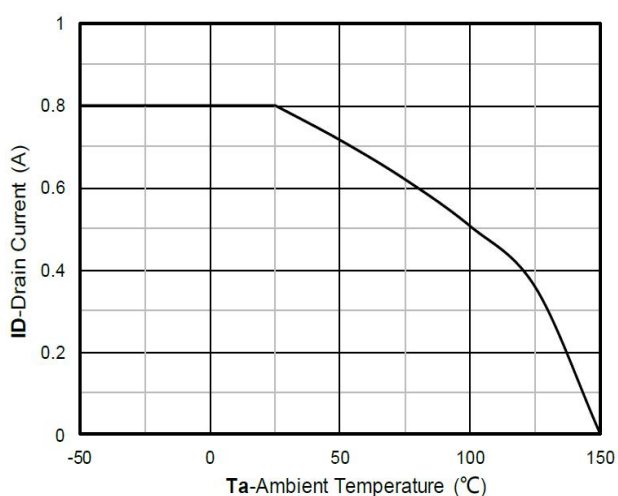


Figure 11. Current dissipation

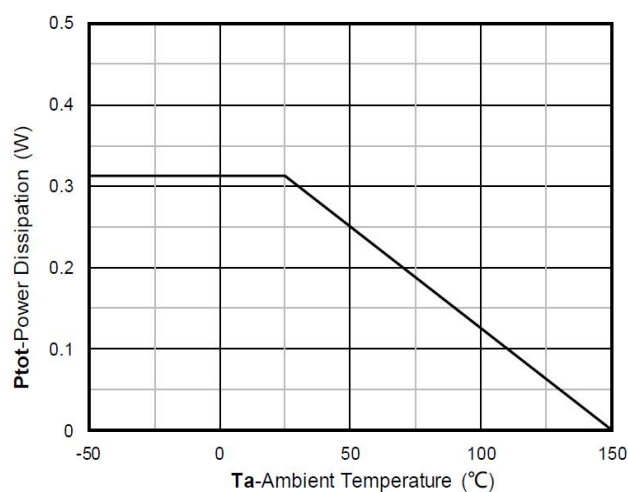


Figure 12. Power dissipation

N-Channel Typical Characteristics

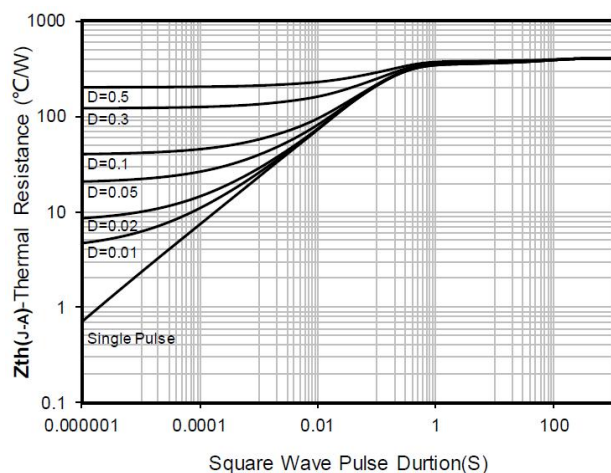


Figure 13. Maximum Transient Thermal Impedance

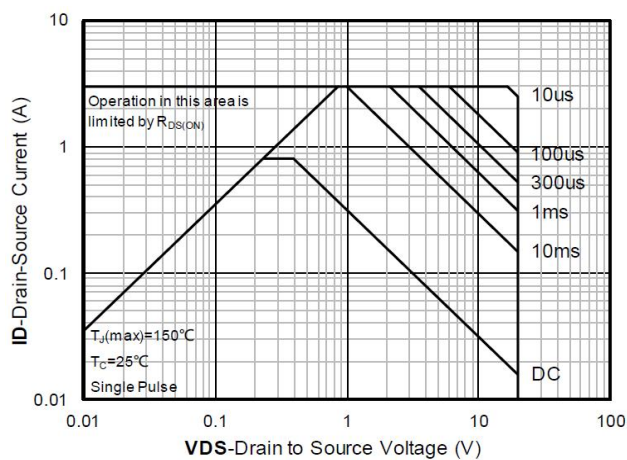


Figure 14. Safe Operation Area

P-Channel Typical Characteristics

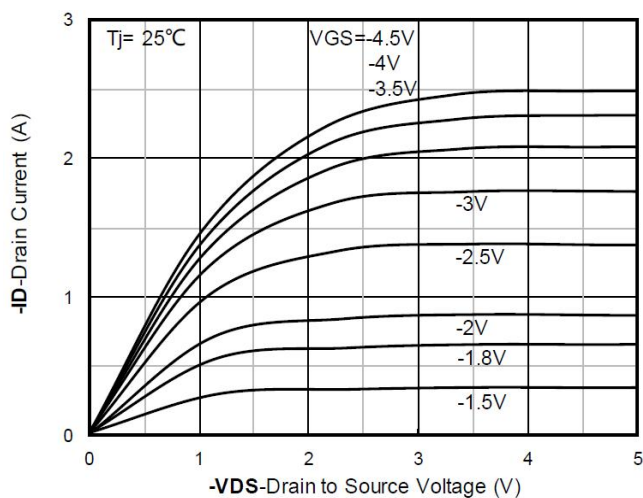


Figure 1. Output Characteristics

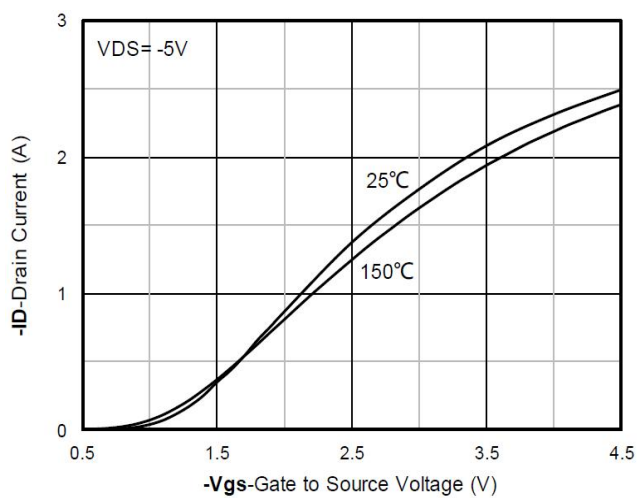


Figure 2. Transfer Characteristics

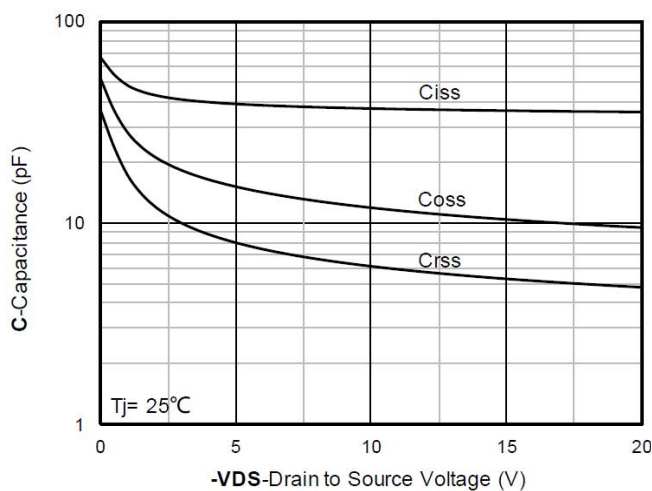


Figure 3. Capacitance Characteristics

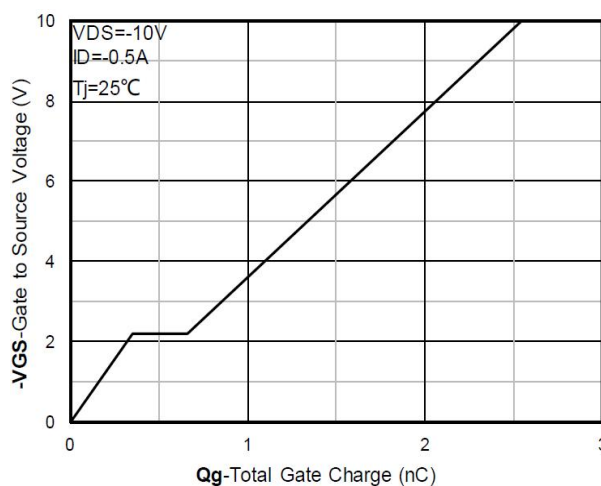


Figure 4. Gate Charge

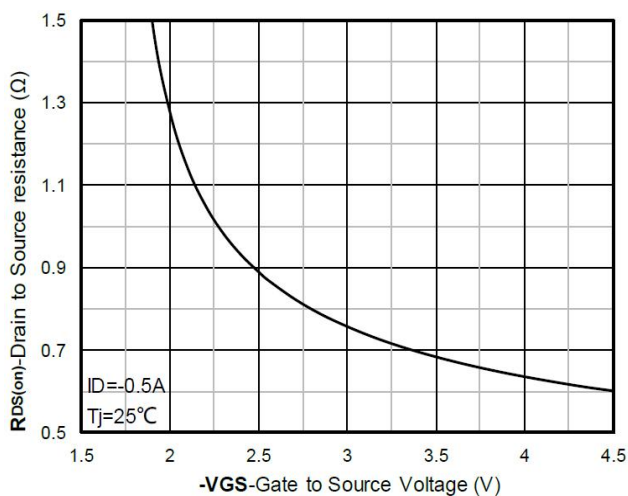


Figure 5. On-Resistance vs Gate to Source Voltage

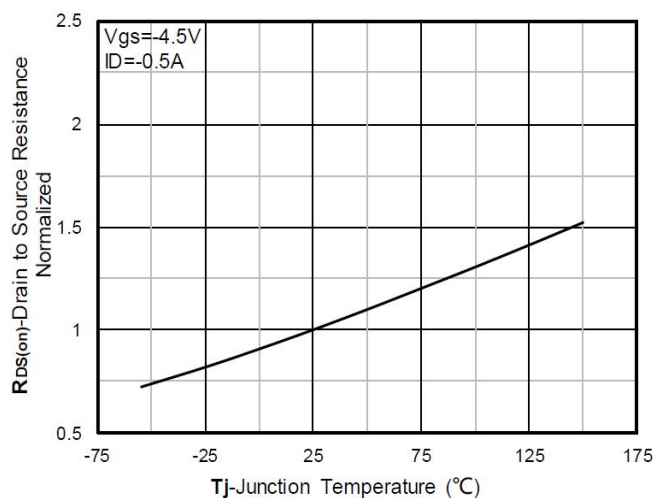


Figure 6. Normalized On-Resistance

P-Channel Typical Characteristics

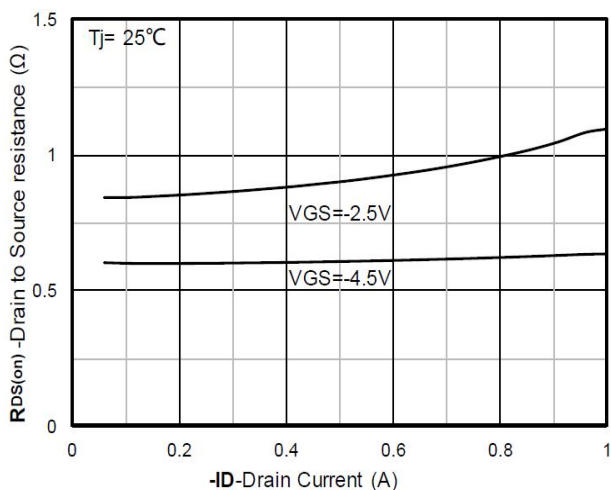


Figure 7. $R_{DS(on)}$ VS Drain Current

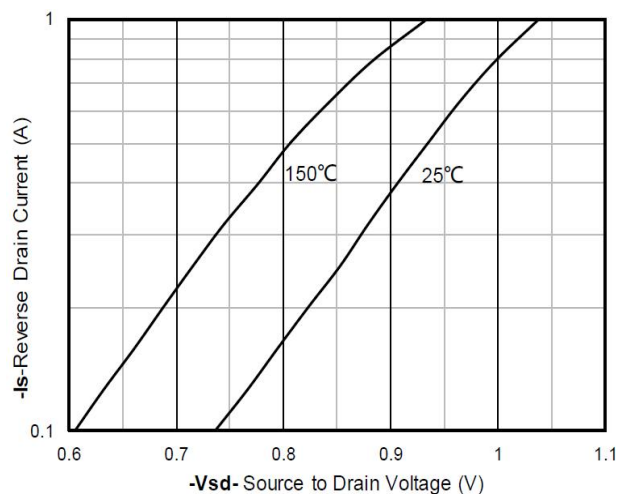


Figure 8. Forward characteristics of reverse diode

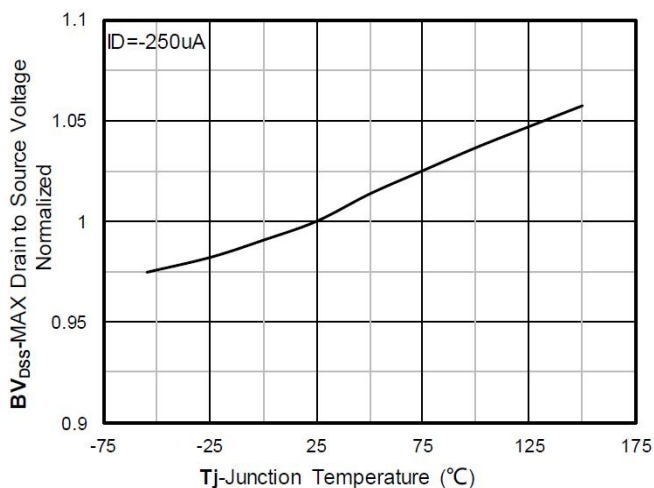


Figure 9. Normalized breakdown voltage

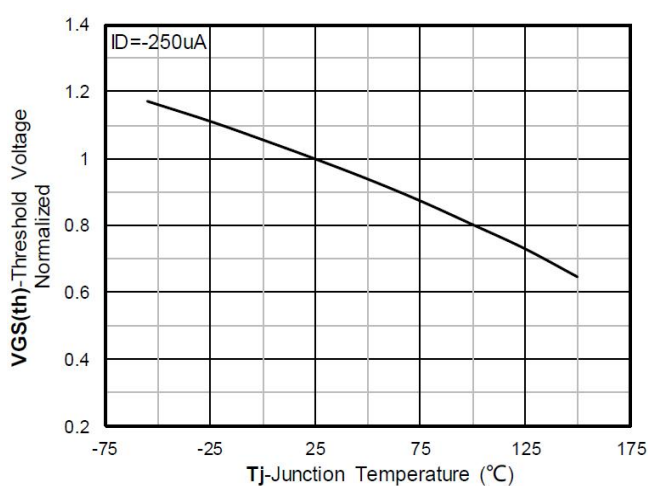


Figure 10. Normalized Threshold voltage

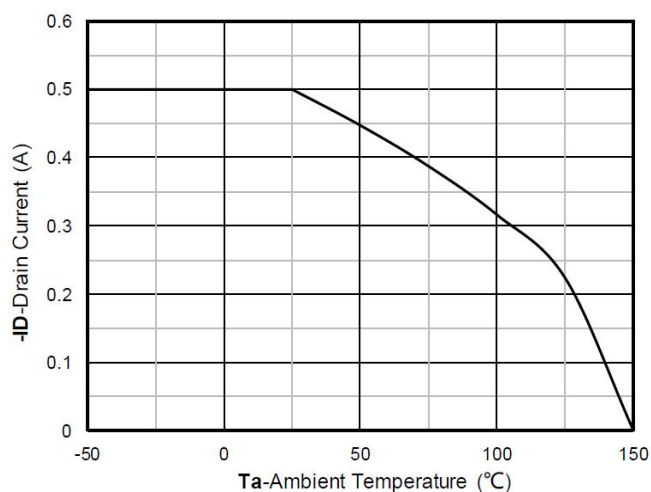


Figure 11. Current dissipation

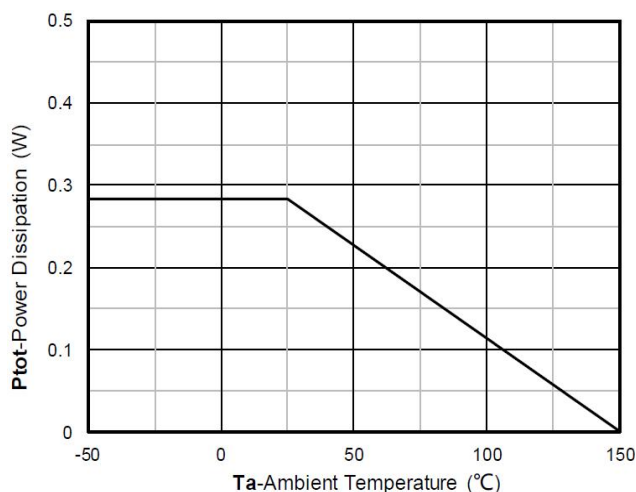


Figure 12. Power dissipation

P-Channel Typical Characteristics

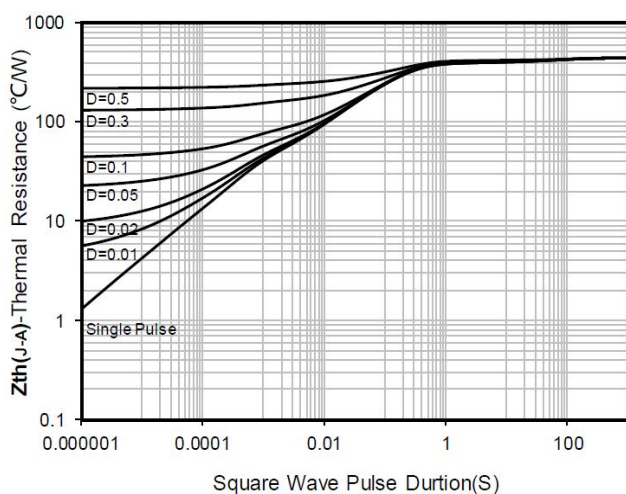


Figure 13. Maximum Transient Thermal Impedance

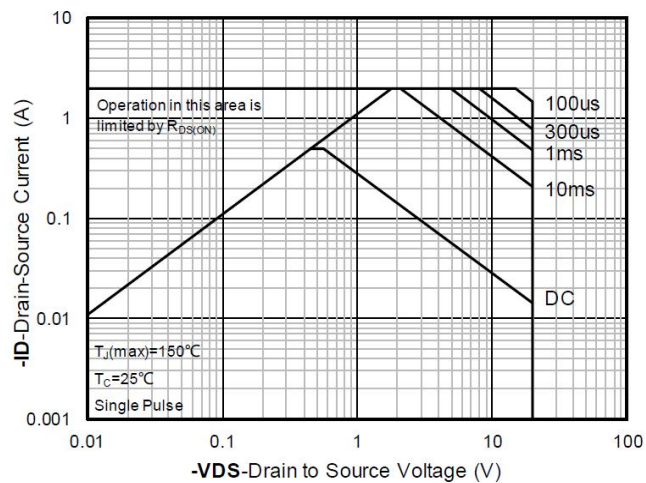
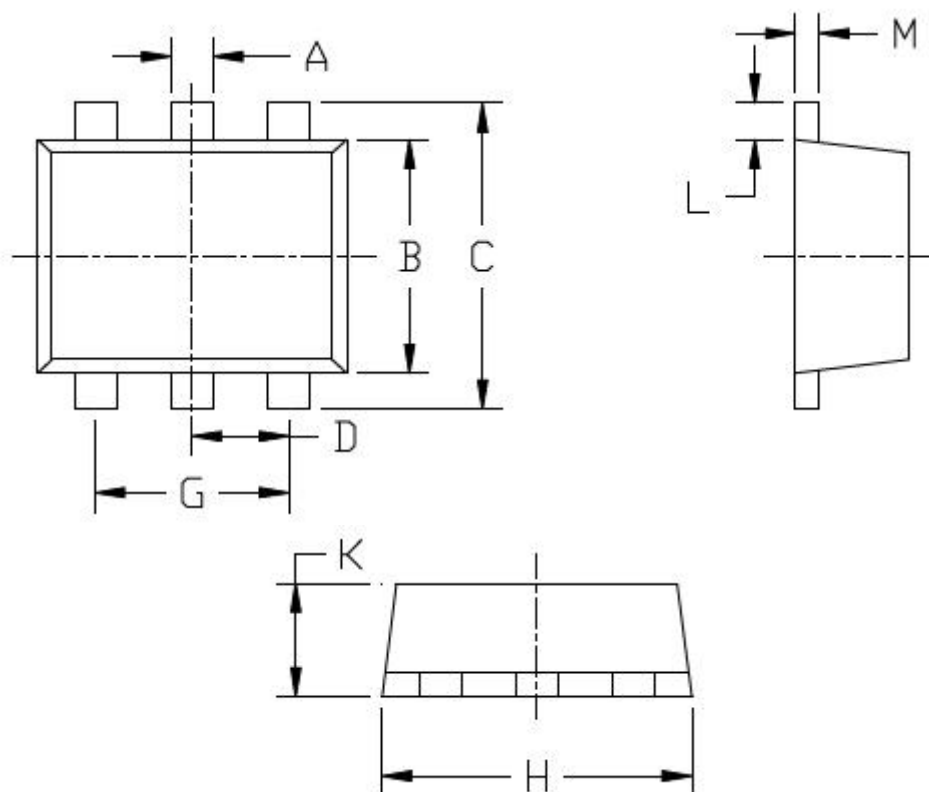


Figure 14. Safe Operation Area

SOT-563 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.150	0.300	0.006	0.011
B	1.100	1.300	0.043	0.051
C	1.500	1.700	0.059	0.067
D	0.400	0.600	0.016	0.024
G	0.900	1.100	0.035	0.043
H	1.500	1.700	0.059	0.067
K	0.550	0.650	0.021	0.026
L	0.100	0.300	0.004	0.011
M	0.100	0.180	0.004	0.007