AT0P3NP050EQSJ-Q1

N and P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D	$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
50V	1.6Ω@10V	0.35A	-60V	4.1Ω@-10V	-0.25A
	2.5Ω@4.5V			5.3Ω@-4.5V	

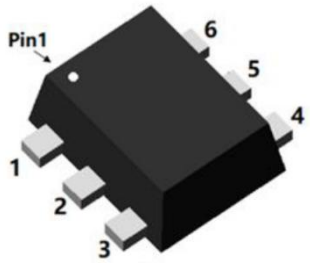
Feature

- Advanced trench technology
- Drive circuits can be simple
- High Speed switching
- ESD protected
- Suffix "-Q1" for AEC-Q101

Application

- Load switch
- Power management

Package



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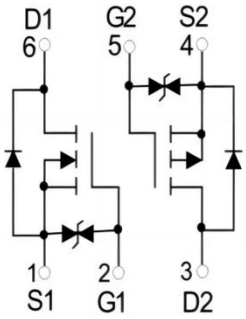
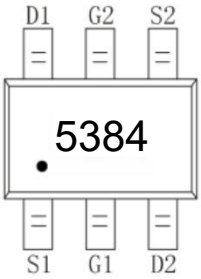
Circuit diagram



Marking



Absolute maximum ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	50	-60	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current[1)]	I_D	0.35	-0.25	A
Continuous Drain Current[1)] (T_A=70℃)	I_D (100℃)	0.28	-0.2	A
Pulsed Drain Current (t_p =10μs)	I_{DM}	1.5	-1	A
Power Dissipation[1)]	P_D	0.3	0.3	W
Thermal Resistance Junction to Ambient[1)]	$R_{\theta JA}$	417	417	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	-55 ~ +150	℃
Storage Temperature	T_{STG}	-55 ~ +150	-55 ~ +150	℃

N-CH Electrical characteristics (T_A=25 ºC, 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	50			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =50V, V_{GS} =0V			1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±10	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	0.5	0.85	1	V
Drain-source on-resistance[2)]	$R_{DS(on)}$	V_{GS} =10V, I_D =0.5A		1.3	1.6	Ω
		V_{GS} =4.5V, I_D =0.2A		1.4	2.5	
		V_{GS} =2.5V, I_D =0.2A		1.7	3	
		V_{GS} =1.8V, I_D =0.05A		2.9	4	
Dynamic characteristics[3)]						
Input Capacitance	C_{iss}	V_{DS} =20V, V_{GS} =0V, f =1MHz		42		pF
Output Capacitance	C_{oss}			11		
Reverse Transfer Capacitance	C_{rss}			6.5		
Total Gate Charge	Q_g	V_{DS} =25V, V_{GS}=10V, I_D =0.2A		4.3		nC
Gate-Source Charge	Q_{gs}			0.8		
Gate-Drain Charge	Q_{gd}			0.4		
Turn-on delay time	$t_{d(on)}$	V_{DS} =30V, V_{GS} =10V, I_D =0.2A R_G =25Ω, R_L =150Ω		7		nS
Turn-on rise time	t_r			5		
Turn-off delay time	$t_{d(off)}$			23		
Turn-off fall time	t_f			13		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				0.35	A
Diode Forward voltage[2)]	V_{SD}	V_{GS} =0V, I_S =0.3A			1.2	V

P-CH Electrical characteristics (T_A=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	-60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-60V, V_{GS} =0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±10	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1	-1.5	-2	V
Drain-source on-resistance[2]	$R_{DS(on)}$	V_{GS} =-10V, I_D =-0.1A		2.1	4.1	Ω
		V_{GS} =-4.5V, I_D =-0.1A		2.6	5.3	
Dynamic characteristics[3]						
Input Capacitance	C_{iss}	V_{DS} =-20V, V_{GS} =0V, f =1MHz		39		pF
Output Capacitance	C_{oss}			11		
Reverse Transfer Capacitance	C_{rss}			3.5		
Total Gate Charge	Q_g	V_{DS} =-25V, V_{GS}=-4.5V I_D =-0.2A		2.2		nC
Gate-Source Charge	Q_{gs}			0.63		
Gate-Drain Charge	Q_{gd}			0.47		
Turn-on delay time	$t_{d(on)}$	V_{DS} =-15V, I_D =-2.5A, R_L=50Ω		2.6		nS
Turn-on rise time	t_r			1.9		
Turn-off delay time	$t_{d(off)}$			17		
Turn-off fall time	t_f			10		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				-0.25	A
Diode Forward voltage[2]	V_{SD}	V_{GS} =0V, I_S =-0.2A			-1.4	V

Notes:

1) The data tested by surface mounted on a 1 inch^2 FR-4 board with 20z copper.

2) The data tested by pulsed, pulse width ≤300us, duty cycle ≤2%.

3) Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

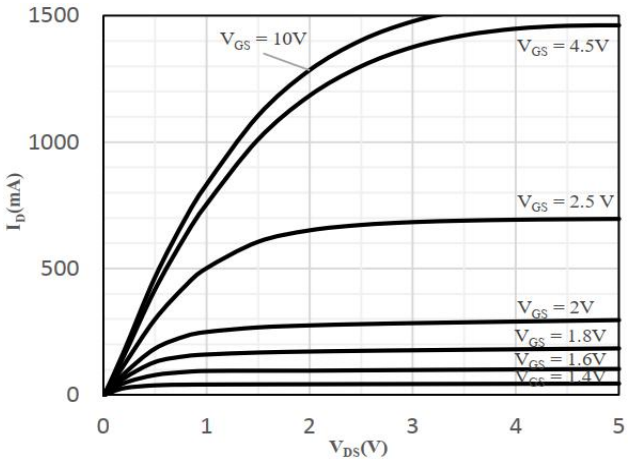


Fig 1 Typical Output Characteristics

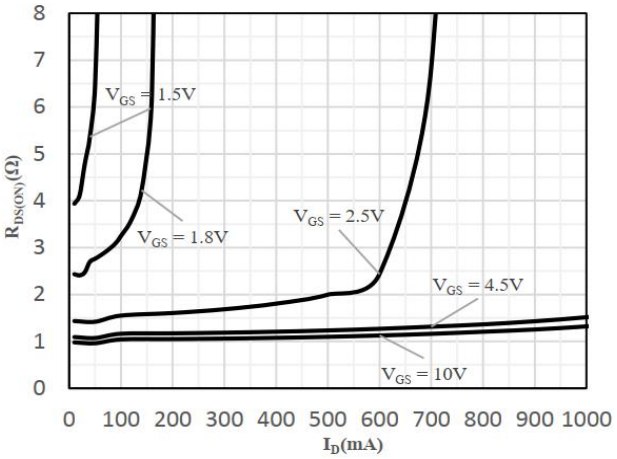


Fig 2 On-Resistance vs. Drain Current and Gate Voltage

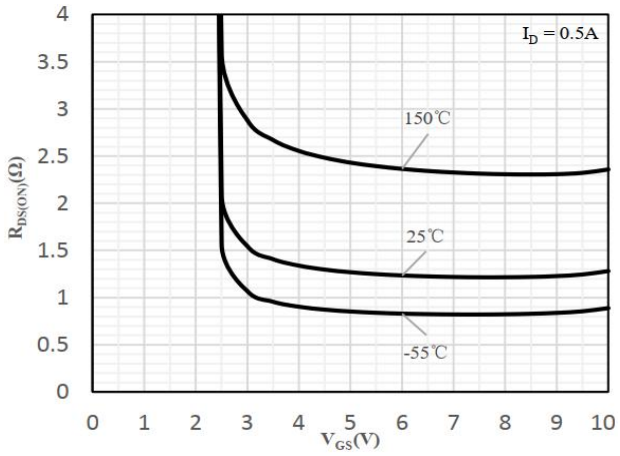


Fig 3 On-Resistance vs. Gate-Source Voltage

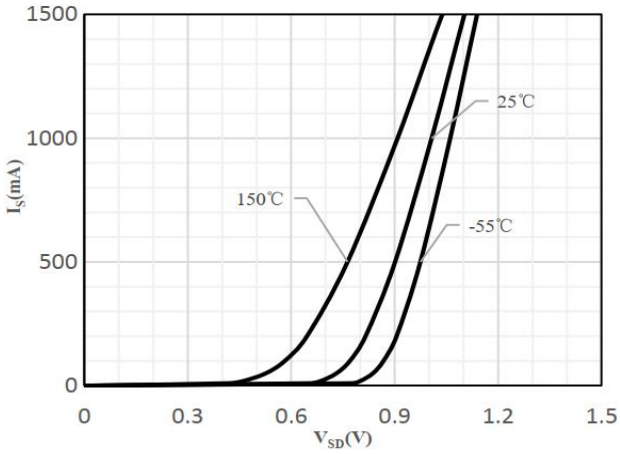


Fig 4 Body-Diode Characteristics

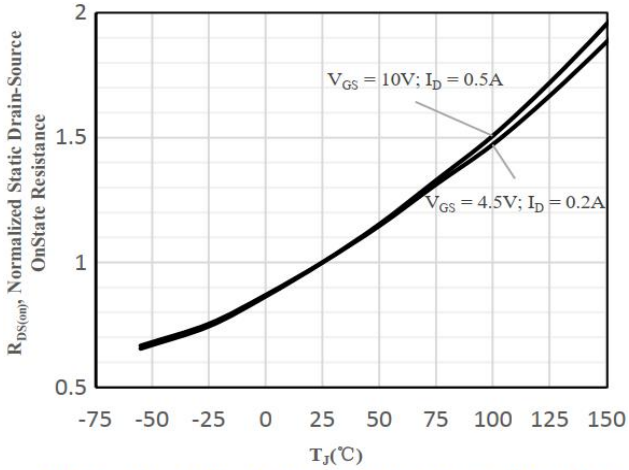


Fig 5 Normalized On-Resistance vs. Junction Temperature

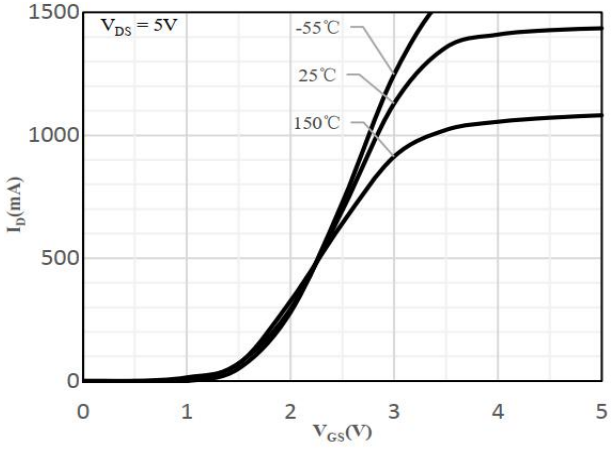


Fig 6 Transfer Characteristics

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N-Channel Typical Characteristics

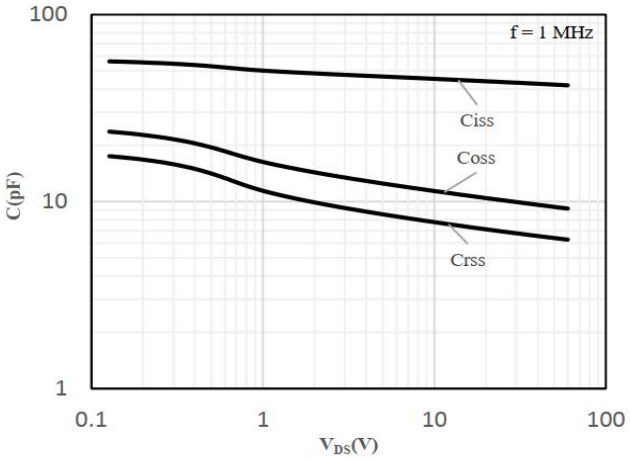

Fig 7 Capacitance Characteristics

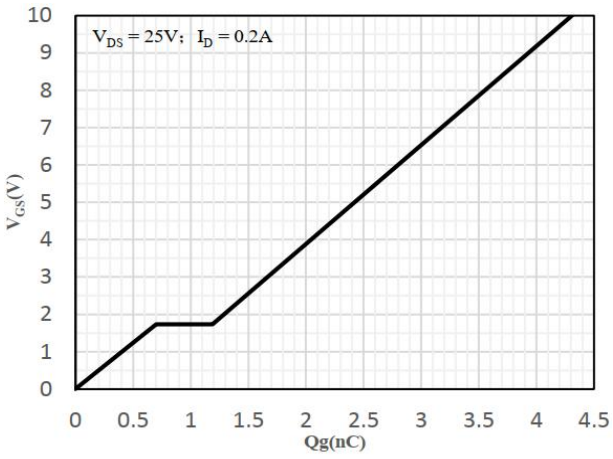

Fig 8 Gate-Charge Characteristics

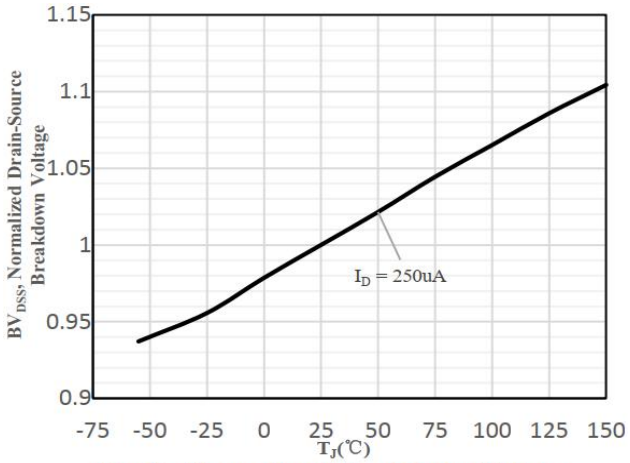

Fig 9 Normalized Breakdown Voltage vs. Junction Temperature

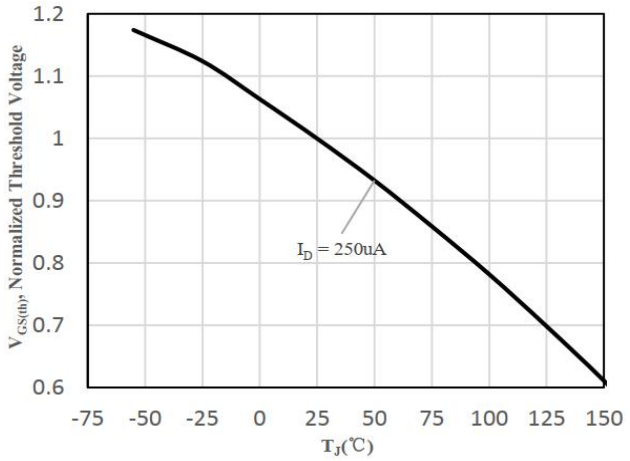

Fig 10 Normalized $V_{GS(th)}$ vs. Junction Temperature

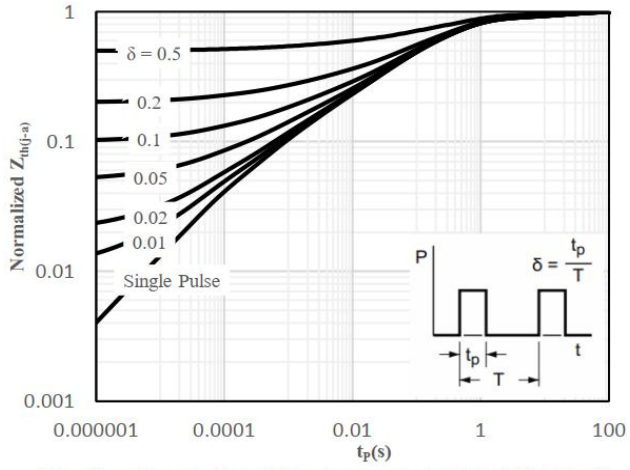

Fig 11 Normalized Maximum transient thermal impedance

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AS-1151348	2023/12/28	2026/03/12	B	8

P-Channel Typical Characteristics

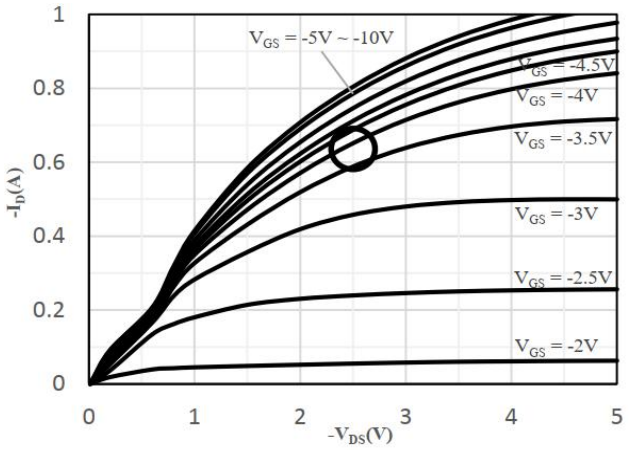


Fig 1 Typical Output Characteristics

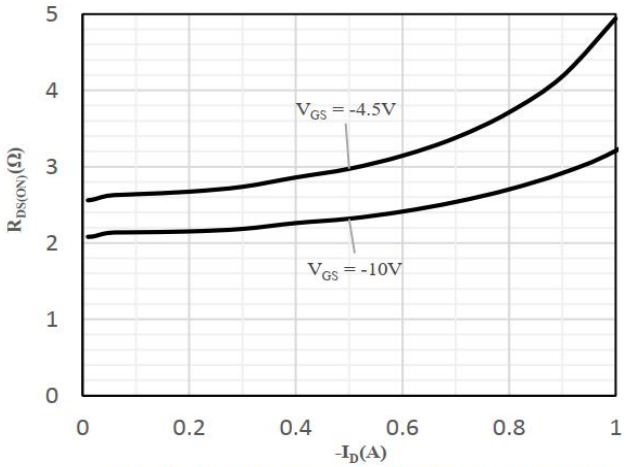


Fig 2 On-Resistance vs. Drain Current and Gate Voltage

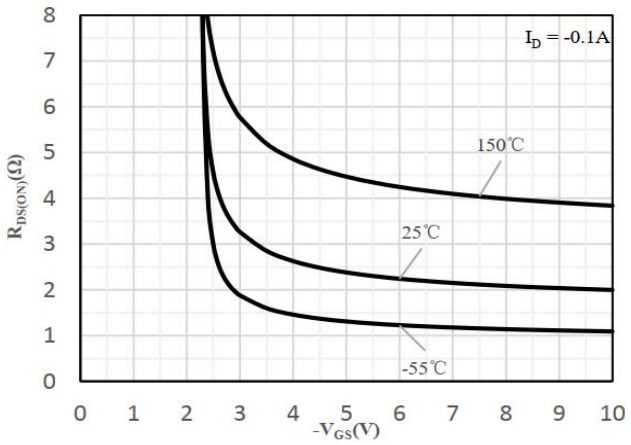


Fig 3 On-Resistance vs. Gate-Source Voltage

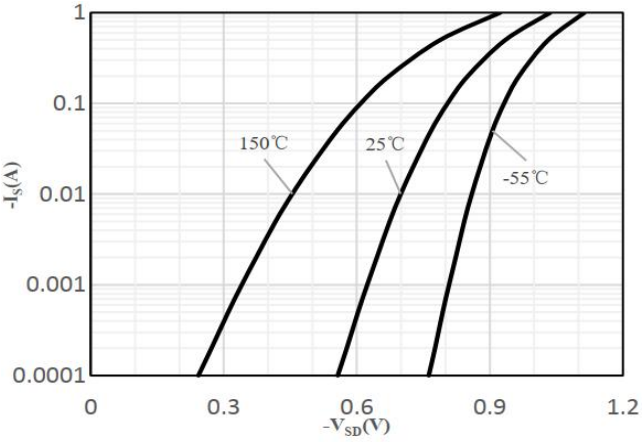


Fig 4 Body-Diode Characteristics

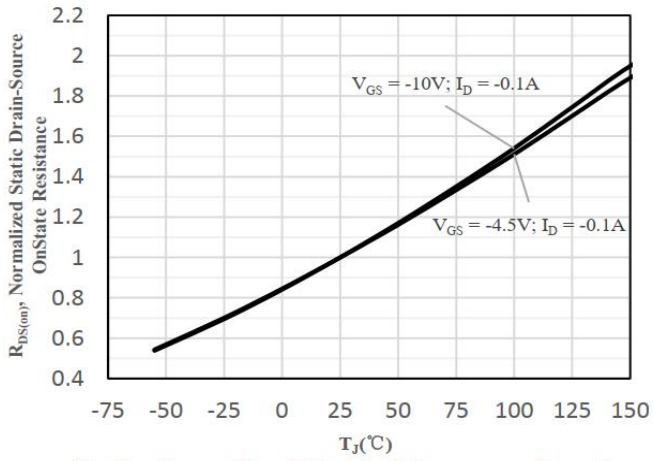


Fig 5 Normalized On-Resistance vs. Junction Temperature

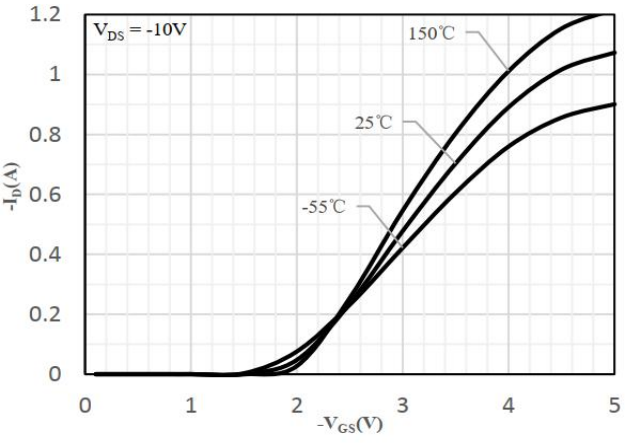


Fig 6 Transfer Characteristics

P-Channel Typical Characteristics

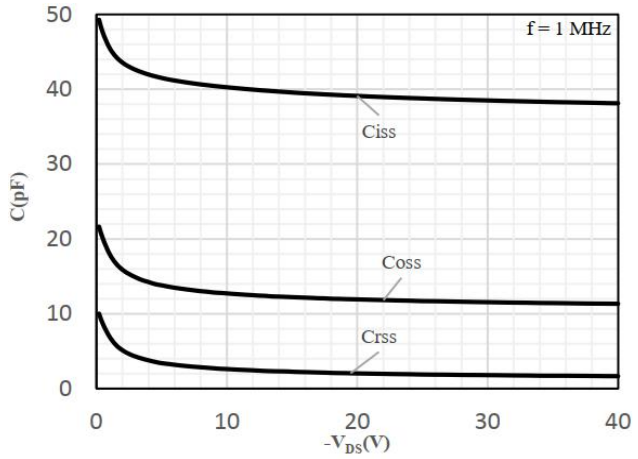


Fig 7 Capacitance Characteristics

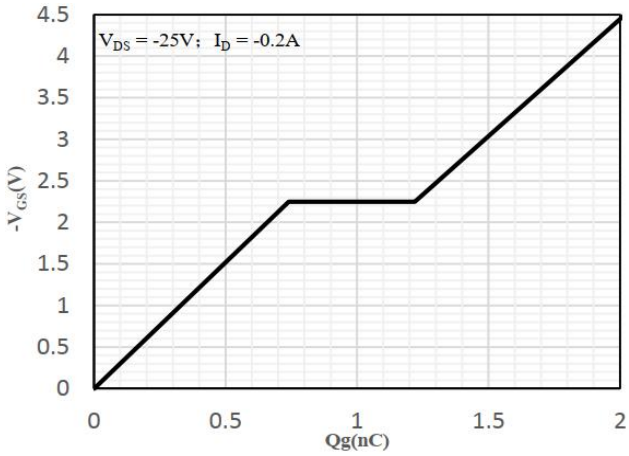


Fig 8 Gate-Charge Characteristics

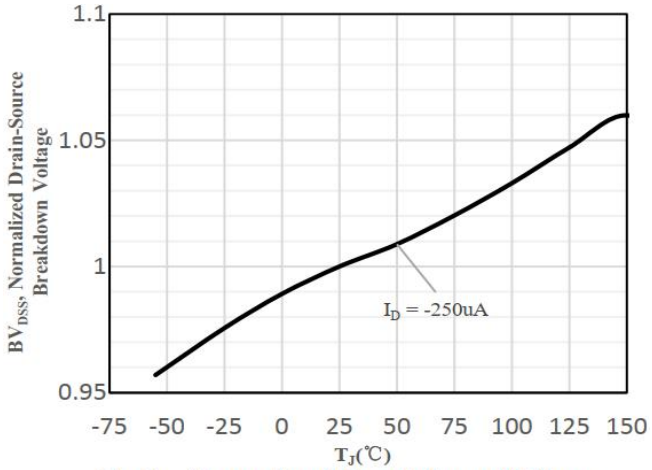


Fig 9 Normalized Breakdown Voltage vs. Junction Temperature

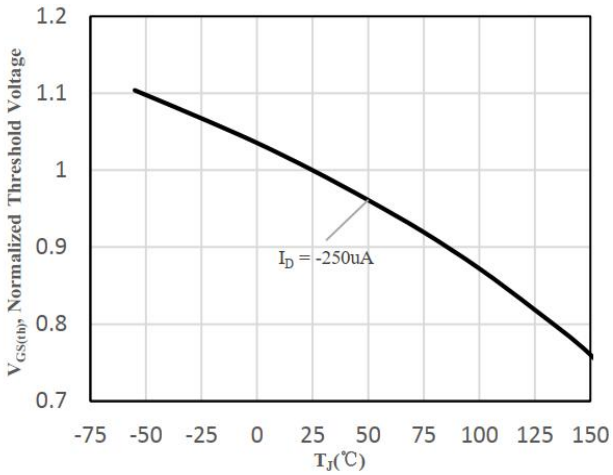


Fig 10 Normalized $V_{GS(th)}$ vs. Junction Temperature

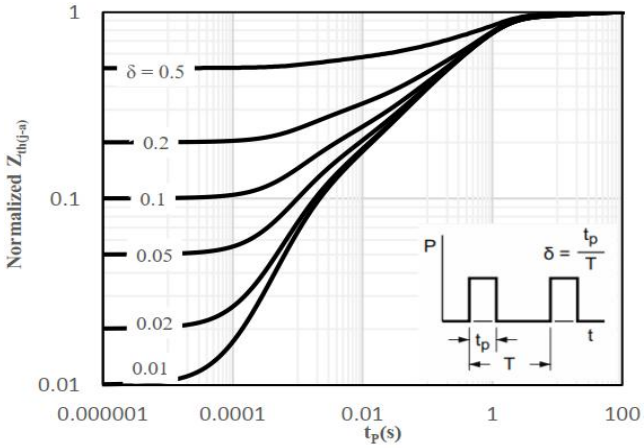
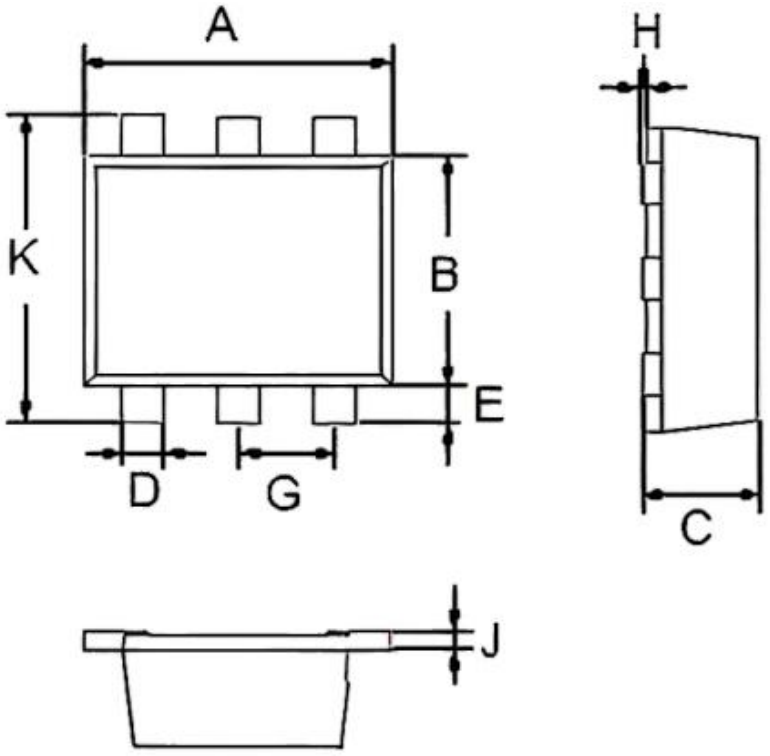


Fig 11 Normalized Maximum transient thermal impedance

SOT-563 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.500	1.700	0.059	0.067
B	1.100	1.300	0.043	0.051
C	0.525	0.600	0.021	0.024
D	0.170	0.270	0.007	0.011
E	0.100	0.300	0.004	0.012
G	0.450	0.550	0.018	0.022
H	0.000	0.050	0.000	0.002
J	0.090	0.160	0.004	0.006
K	1.500	1.700	0.059	0.067