

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D	$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
60V	2.5Ω@4.5V	0.23A	-60V	3Ω@-10V	-0.22A
	3Ω@2.5V			3.5Ω@-4.5V	

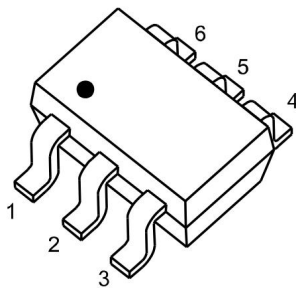
Feature

- Voltage controlled small signal switch
- Low input Capacitance
- Fast Switching Speed
- ESD Protection
- Suffix "-Q1" for AEC-Q101

Application

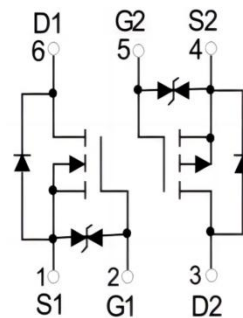
- Battery operated systems
- Solid-state relays
- Direct logic-level interface: TTL/CMOS

Package

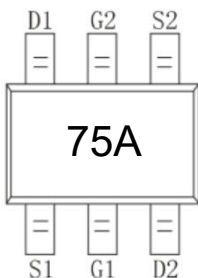


SOT-363

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}	60	-60	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current ^{1,2)} (N-CH: $V_{GS}=10\text{V}$; P-CH: $V_{GS}=-10\text{V}$)	I_D	0.23	-0.22	A
Continuous Drain Current ^{1,2)} (N-CH: $V_{GS}=10\text{V}$; P-CH: $V_{GS}=-10\text{V}$, $T_A=100^{\circ}\text{C}$)	$I_D(100^{\circ}\text{C})$	0.14	-0.14	A
Pulsed Drain Current ($t_p \leq 10\mu\text{s}$)	I_{DM}	1	-1.4	A
Power Dissipation ^{1,2)}	P_D	0.27	0.28	W
Thermal Resistance Junction to Ambient ²⁾	$R_{\theta JA}$	464	442	$^{\circ}\text{C}/\text{W}$
Operating Junction Temperature	T_J	-55 ~ +150	-55 ~ +150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55 ~ +150	-55 ~ +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	$V_{(BR)DSS}$	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	60			V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=60\text{V}$, $V_{GS}=0\text{V}$			1	μA
Gate-body leakage current	I_{GSS}	$V_{DS}=0\text{V}$, $V_{GS}=\pm 20\text{V}$			± 10	μA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	1	1.5	2	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}$, $I_D=0.2\text{A}$		1.6	2.5	Ω
		$V_{GS}=4.5\text{V}$, $I_D=0.1\text{A}$		1.8	3	
Dynamic characteristics³⁾						
Input Capacitance	C_{iss}	$V_{DS}=30\text{V}$, $V_{GS}=0\text{V}$, $f=1\text{MHz}$		15.6		pF
Output Capacitance	C_{oss}			3.9		
Reverse Transfer Capacitance	C_{rss}			0.9		
Total Gate Charge	Q_g	$V_{DS}=30\text{V}$, $V_{GS}=10\text{V}$, $I_D=0.3\text{A}$		0.79		nC
Gate-Source Charge	Q_{gs}			0.07		
Gate-Drain Charge	Q_{gd}			0.1		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=30\text{V}$, $V_{GS}=10\text{V}$, $I_D=0.3\text{A}$ $R_G=30\Omega$		3		nS
Turn-on rise time	t_r			3		
Turn-off delay time	$t_{d(off)}$			11		
Turn-off fall time	t_f			40		
Source-Drain Diode characteristics						
Diode Forward Current	I_S	$T_A=25^{\circ}\text{C}$			0.23	A
Diode Forward voltage	V_{SD}	$V_{GS}=0\text{V}$, $I_S=0.2\text{A}$			1.2	V
Reverse Recovery Time	T_{rr}	$V_{GS}=0\text{V}$, $V_R=30\text{V}$, $I_S=0.3\text{A}$ $di/dt=-100\text{A}/\mu\text{s}$		11		nS
Reverse Recovery Charge	Q_{rr}			4		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	-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	-1.56	-2	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-0.2A		2	3	Ω
		V _{GS} =-4.5V, I _D =-0.1A		2.4	3.5	
Dynamic characteristics³⁾						
Input Capacitance	C _{iss}	V _{DS} =-30V, V _{GS} =0V, f =1MHz		35.4		pF
Output Capacitance	C _{oss}			4.7		
Reverse Transfer Capacitance	C _{rss}			2.4		
Total Gate Charge	Q _g	V _{DS} =-30V, V _{GS} =-10V I _D =-0.4A		1.53		nC
Gate-Source Charge	Q _{gs}			0.17		
Gate-Drain Charge	Q _{gd}			0.23		
Turn-on delay time	t _{d(on)}	V _{DS} =-30V, V _{GS} =-10V I _D =-0.4A, R _G =3Ω		5.4		nS
Turn-on rise time	t _r			3.8		
Turn-off delay time	t _{d(off)}			32		
Turn-off fall time	t _f			34		
Source-Drain Diode characteristics						
Diode Forward Current	I _S	T _A =25°C			-0.22	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _S =-0.2A			-1.3	V
Reverse Recovery Time	T _{rr}	V _{GS} =0V, V _R =30V, I _S =0.4A di/dt =-100A/us		15		nS
Reverse Recovery Charge	Q _{rr}				9	

Notes:

- 1) The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- 2) The value of R_{θJA} is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 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.
- 3) Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

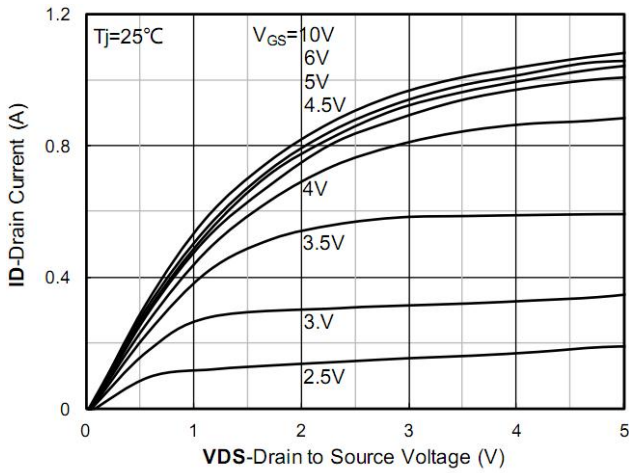


Figure 1. Output Characteristics; typical values

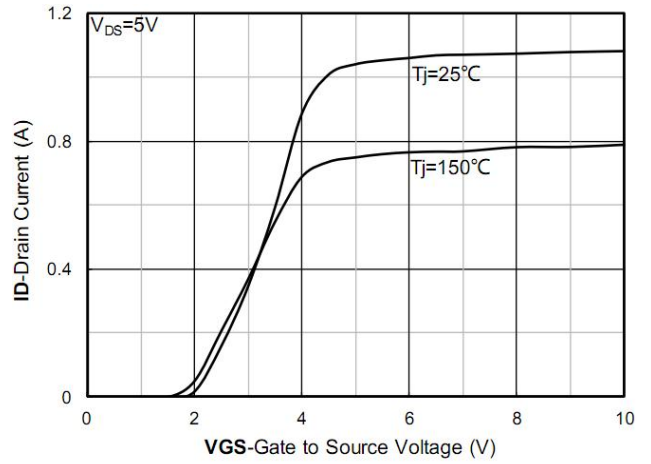


Figure 2. Transfer Characteristics; typical values

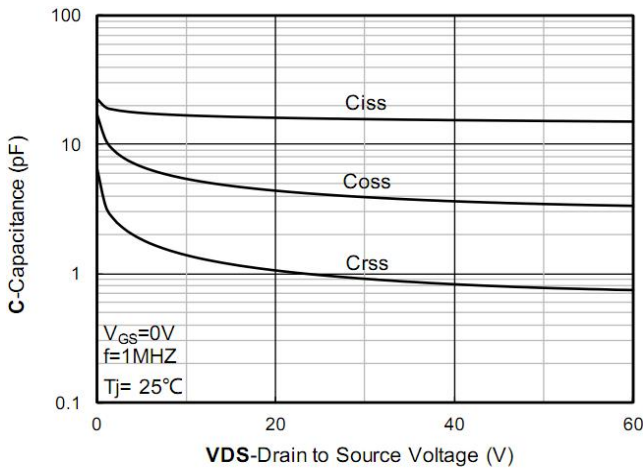


Figure 3. Capacitance Characteristics; typical values

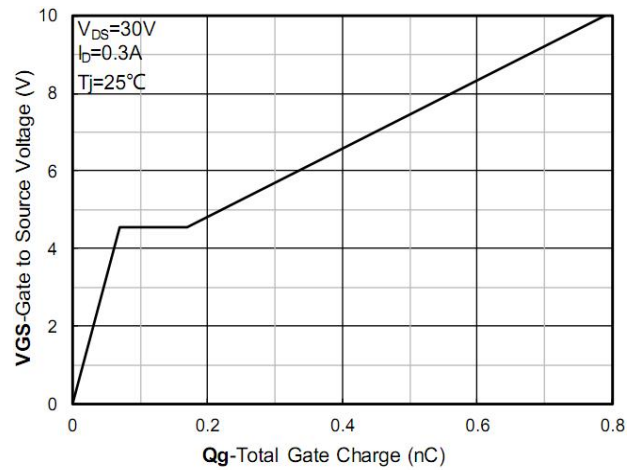


Figure 4. Gate Charge; typical values

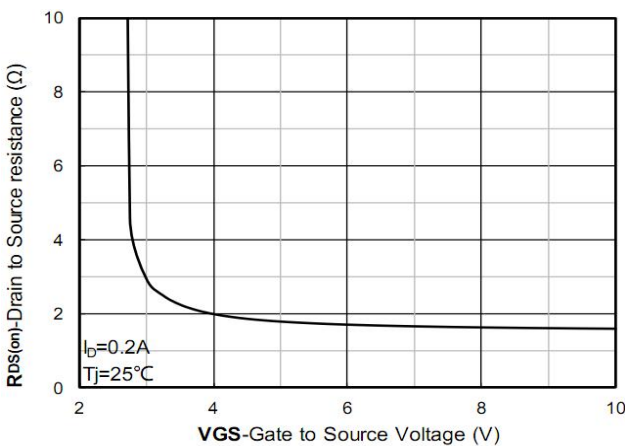


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

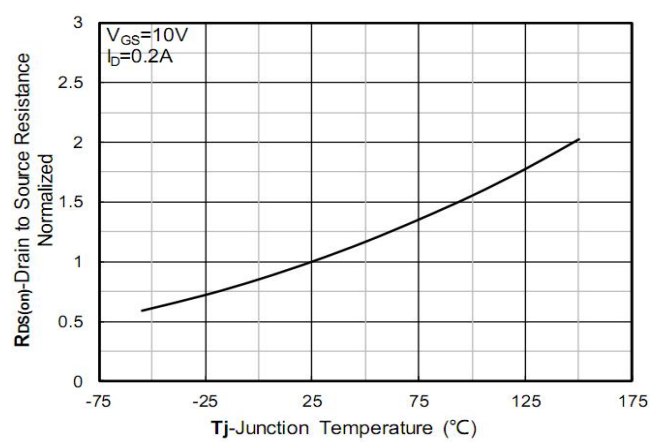


Figure 6. Normalized On -Resistance

N-Channel Typical Characteristics

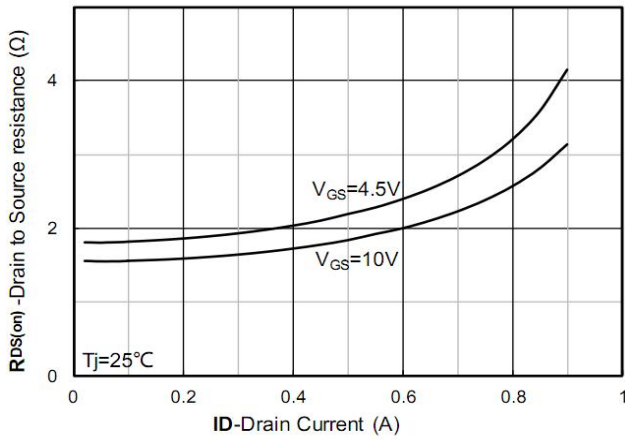


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

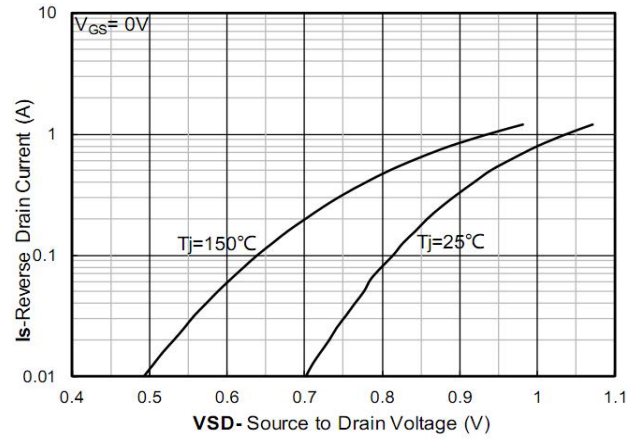


Figure 8. Forward characteristics of reverse diode; typical values

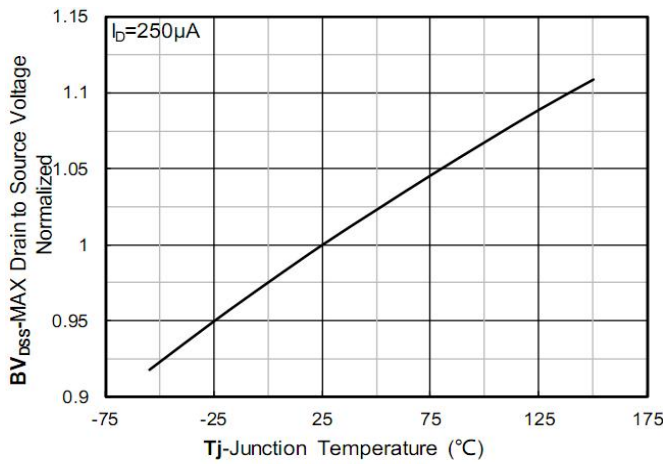


Figure 9. Normalized breakdown voltage

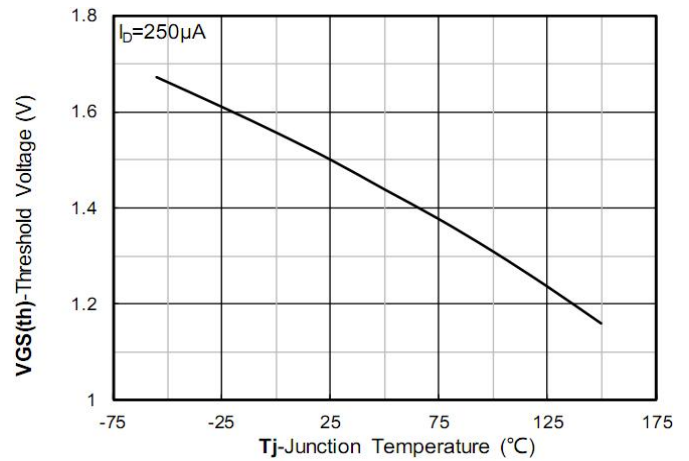


Figure 10. Gate Threshold voltage; typical values

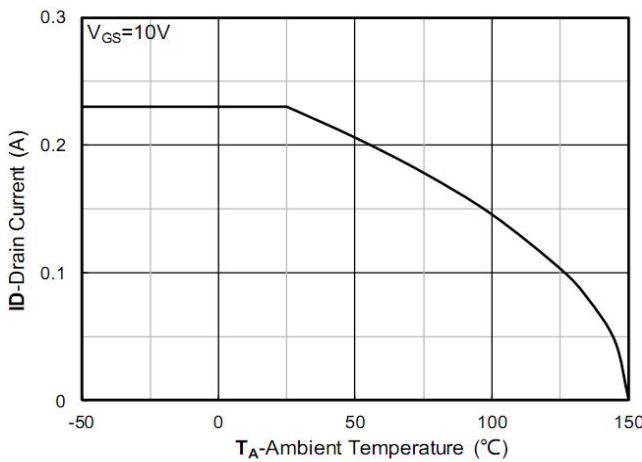


Figure 11. Current dissipation

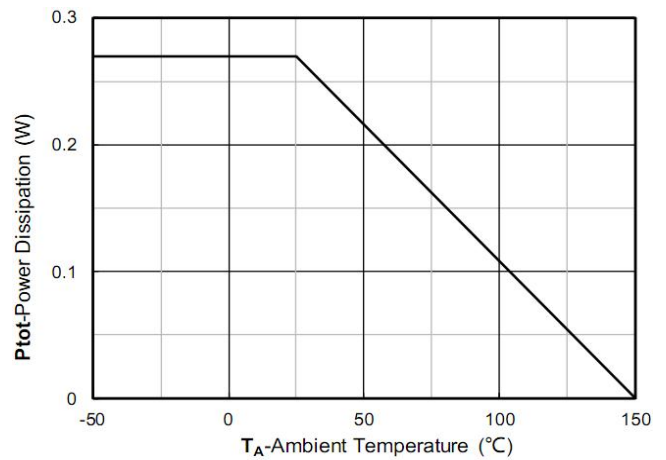


Figure 12. Power dissipation

N-Channel Typical Characteristics

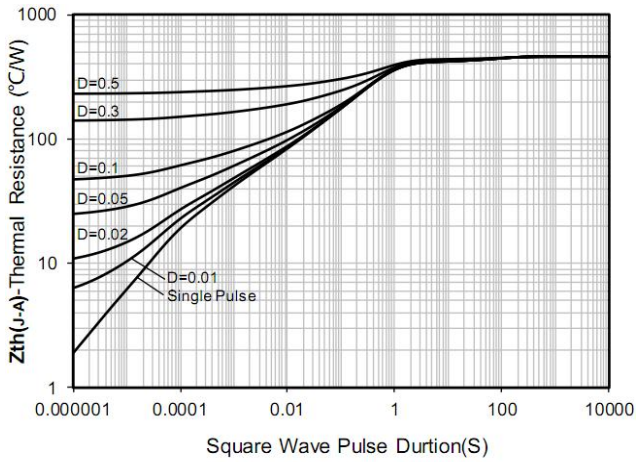


Figure 13. Maximum Transient Thermal Impedance

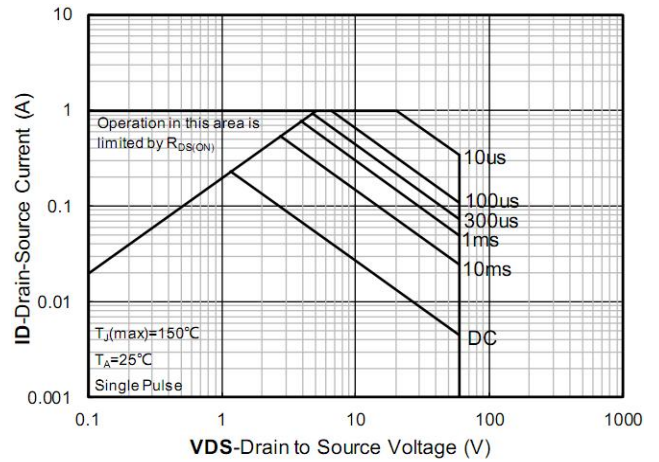


Figure 14. Safe Operation Area

P-Channel Typical Characteristics

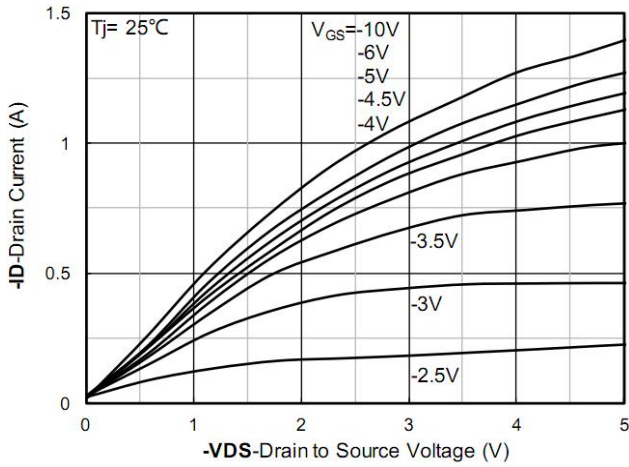


Figure 1. Output Characteristics; typical values

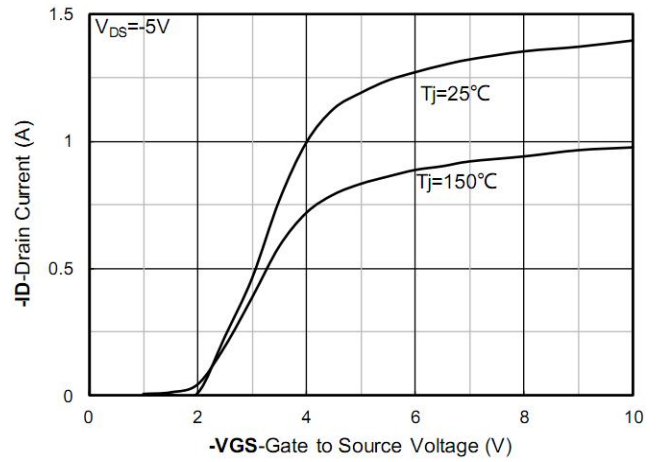


Figure 2. Transfer Characteristics; typical values

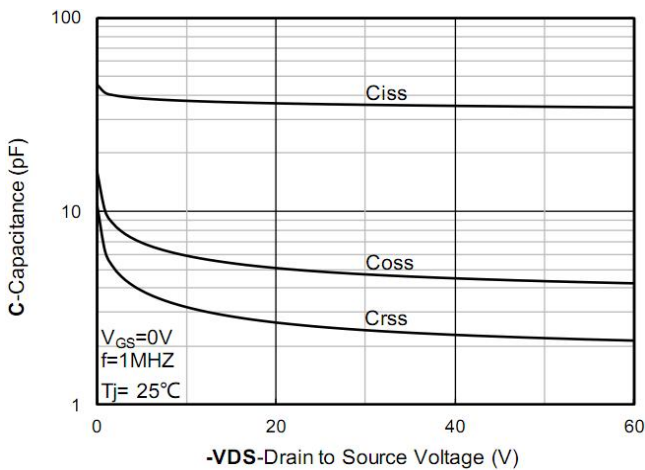


Figure 3. Capacitance Characteristics; typical values

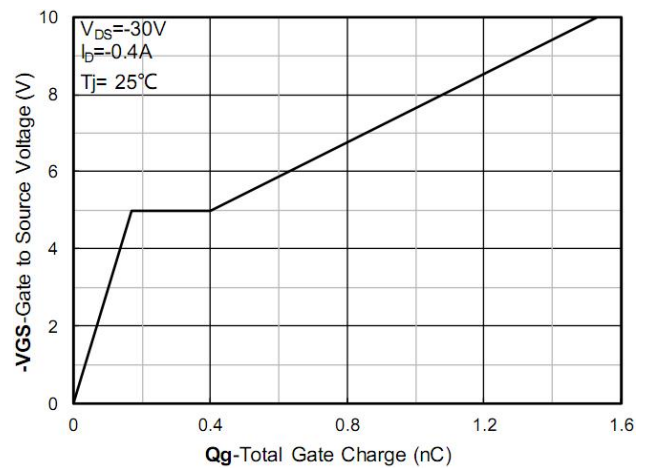


Figure 4. Gate Charge; typical values

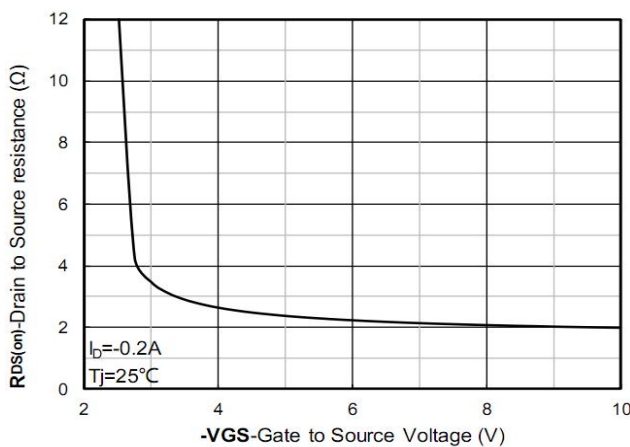


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

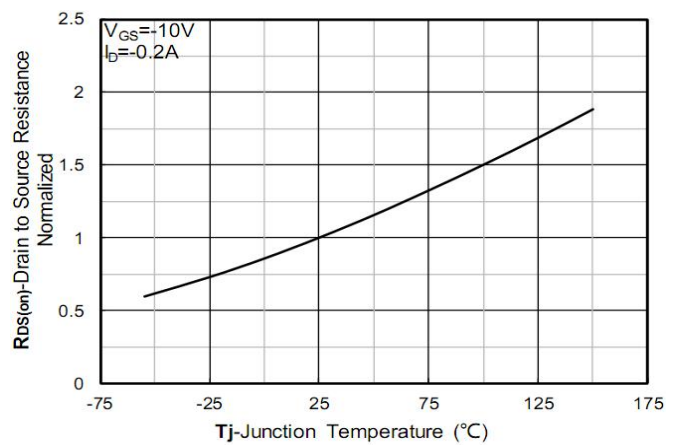


Figure 6. Normalized On-Resistance

P-Channel Typical Characteristics

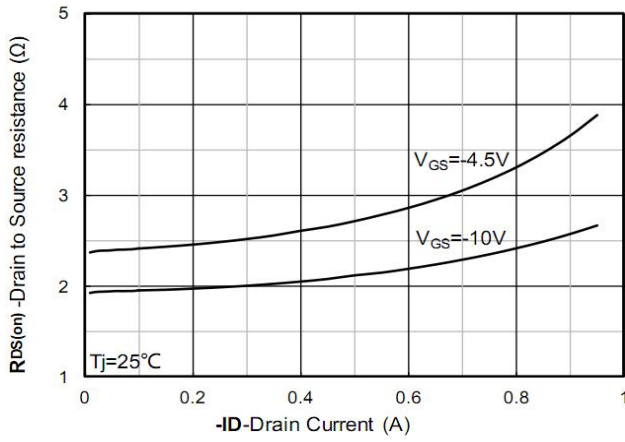


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

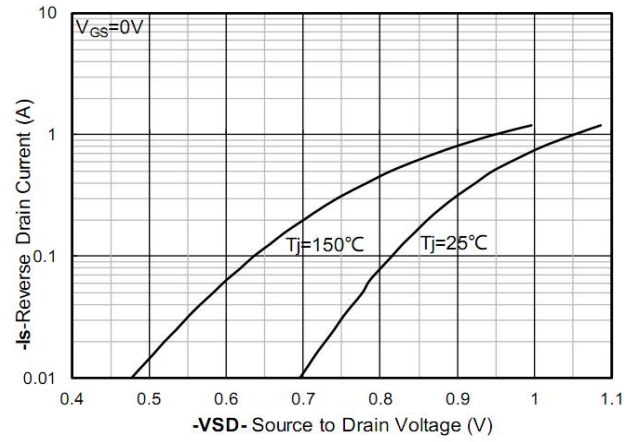


Figure 8. Forward characteristics of reverse diode; typical values

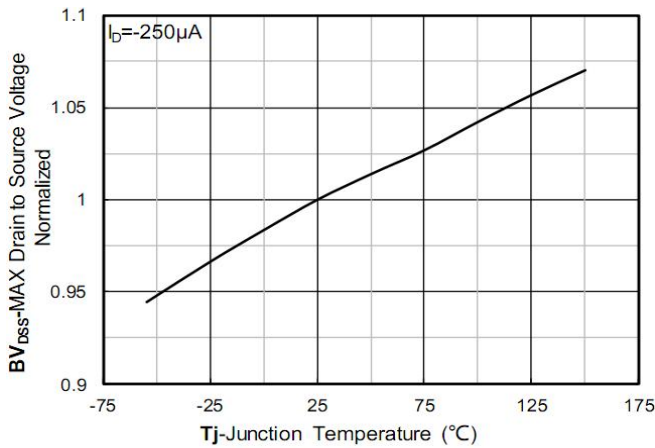


Figure 9. Normalized breakdown voltage

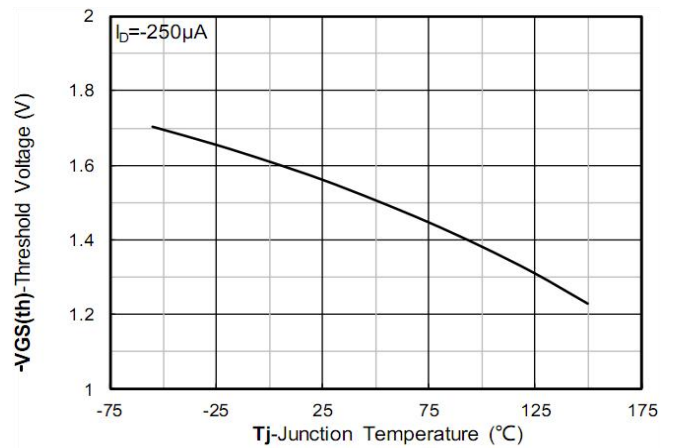


Figure 10. Gate Threshold voltage; typical values

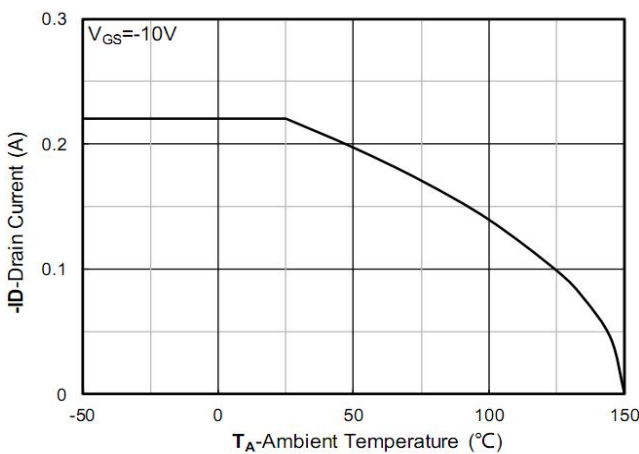


Figure 11. Current dissipation

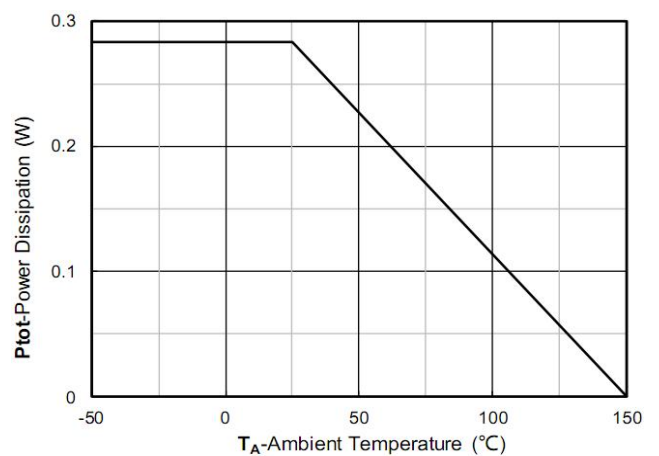


Figure 12. Power dissipation

P-Channel Typical Characteristics

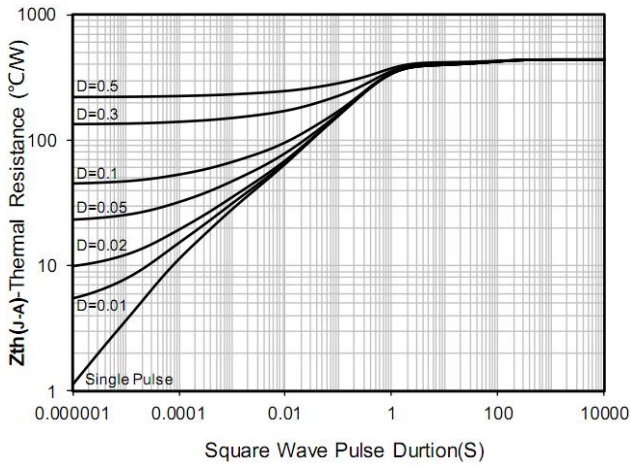


Figure 13. Maximum Transient Thermal Impedance

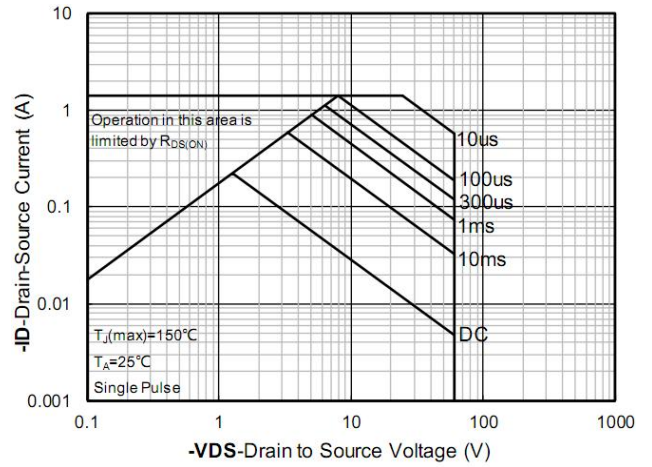
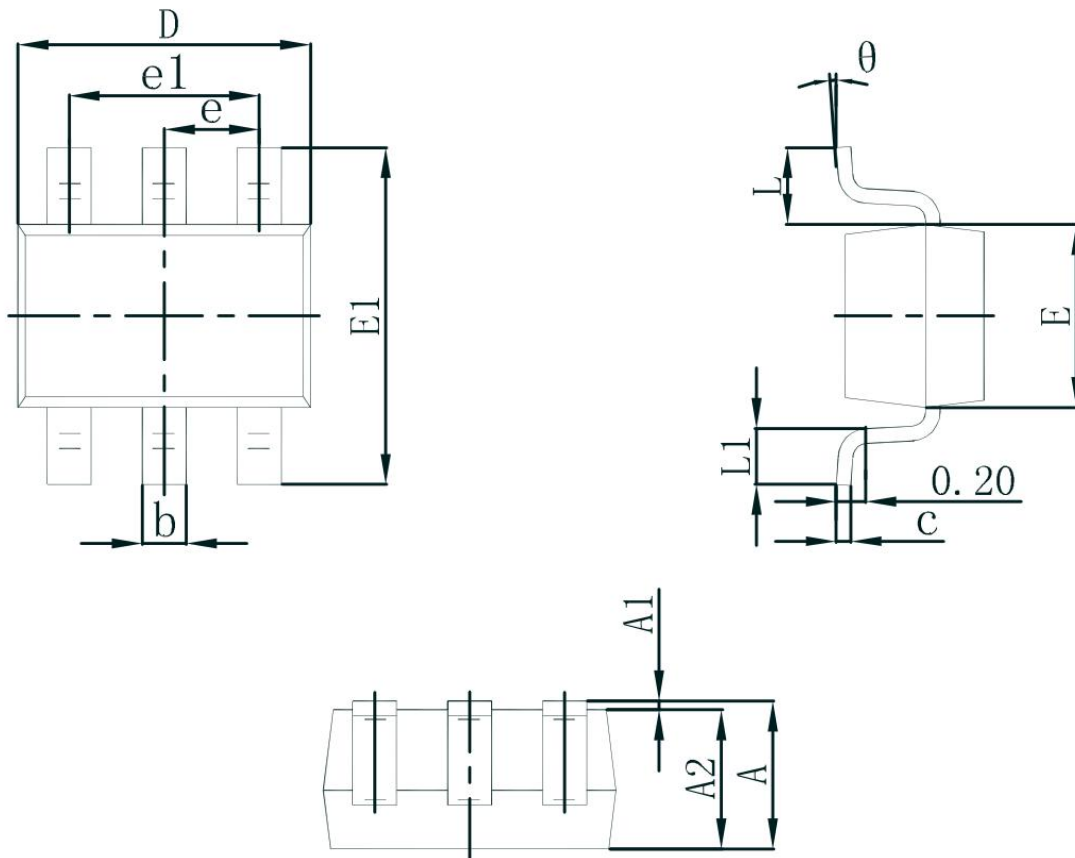


Figure 14. Safe Operation Area

SOT-363 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.100	0.250	0.004	0.010
D	1.800	2.200	0.071	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP.		0.026 TYP.	
e1	1.200	1.400	0.047	0.055
L	0.525 REF.		0.021 REF.	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°