

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D	$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
40V	16mΩ@10V	7A	-40V	32mΩ@-10V	-5A
	21mΩ@4.5V			46mΩ@-4.5V	

Feature

- High density cell design for low $R_{DS(ON)}$
- High Speed switching
- Excellent stability and uniformity
- Suffix "-Q1" for AEC-Q101

Application

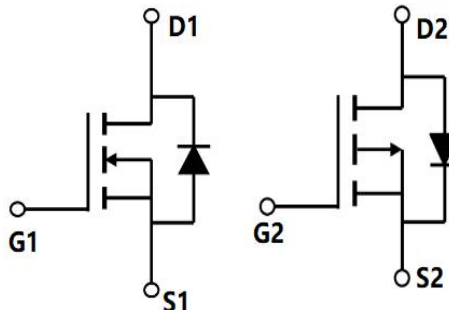
- Power switching application
- Uninterruptible power supply
- Load switch
- Portable equipment

Package



SOP-8

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}	40	-40	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current ^{1,2)} (N-Mos: $V_{GS}=10\text{V}$; P-Mos: $V_{GS}=-10\text{V}$)	I_D	7	-5	A
Continuous Drain Current ^{1,2)} (N-Mos: $V_{GS}=10\text{V}$; P-Mos: $V_{GS}=-10\text{V}$, $T_A=100^{\circ}\text{C}$)	$I_D(100^{\circ}\text{C})$	4.4	-3.2	
Pulsed Drain Current ($t_p \leq 10\mu\text{s}$)	I_{DM}	56	-40	A
Single Pulse Avalanche Energy ^{3,4)}	E_{AS}	49	50	mJ
Power Dissipation ^{1,2)}	P_D	1.43	1.38	W
Thermal Resistance Junction to Ambient ²⁾	$R_{\theta JA}$	87	90	$^{\circ}\text{C/W}$
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	40			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =40V, V _{GS} =0V			1	μA
Gate-body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.5	2	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =10V, I _D =7A		12.5	16	mΩ
		V _{GS} =4.5V, I _D =4A		15.6	21	
Dynamic characteristics ⁵⁾						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, f =1MHz		1012		pF
Output Capacitance	C _{oss}			96		
Reverse Transfer Capacitance	C _{rss}			84		
Total Gate Charge	Q _g	V _{DS} =20V, V _{GS} =10V, I _D =7A		21.5		nC
Gtae-Source Charge	Q _{gs}			3		
Gtae-Drain Charge	Q _{gd}			4.5		
Turn-on delay time	t _{d(on)}	V _{DS} =20V, V _{GS} =10V, I _D =7A R _G =3Ω		7		nS
Turn-on rise time	t _r			3.5		
Turn-off delay time	t _{d(off)}			29		
Turn-off fall time	t _f			6		
Source-Drain Diode characteristics						
Diode Forward Current	I _S				7	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _S =1.6A			1.2	V
Reverse recover time	T _{rr}	V _{GS} =0V, V _R =20V, I _F =7A		13		nS
Reverse recovery charge	Q _{rr}	di/dt =-100A/us		8		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	-40			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V			-1	μA
Gate-body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.1	-1.6	-2.1	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-5A		24.6	32	mΩ
		V _{GS} =-4.5V, I _D =-3A		33.4	46	
Dynamic characteristics ⁵⁾						
Input Capacitance	C _{iss}	V _{DS} =-20V, V _{GS} =0V, f =1MHz		1135		pF
Output Capacitance	C _{oss}			118		
Reverse Transfer Capacitance	C _{rss}			105		
Total Gate Charge	Q _g	V _{DS} =-20V, V _{GS} =-10V I _D =-5A		26		nC
Gtae-Source Charge	Q _{gs}			3.6		
Gtae-Drain Charge	Q _{gd}			4.3		
Turn-on delay time	t _{d(on)}	V _{DS} =-20V, V _{GS} =-10V I _D =-5A, R _G =3Ω		7		nS
Turn-on rise time	t _r			3.8		
Turn-off delay time	t _{d(off)}			90		
Turn-off fall time	t _f			53		
Source-Drain Diode characteristics						
Diode Forward Current	I _S				-5	A
Diode Forward voltage	V _{SD}	V _{GS} =0V, I _S =-1.5A			-1.2	V
Reverse recover time	T _{rr}	V _{GS} =0V, V _R =-20V, I _F =-5A di/dt =-100A/us		31		nS
Reverse recovery charge	Q _{rr}			23		nC

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) EAS test condition: N-MOS: T_J = 25°C, V_G = 10V, R_G = 25Ω, L = 0.5mH, I_{AS} = 14A.
- 4) EAS test condition: P-MOS: T_J = 25°C, V_G = -10V, R_G = 25Ω, L = 1mH, I_{AS} = -10A.
- 5) Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

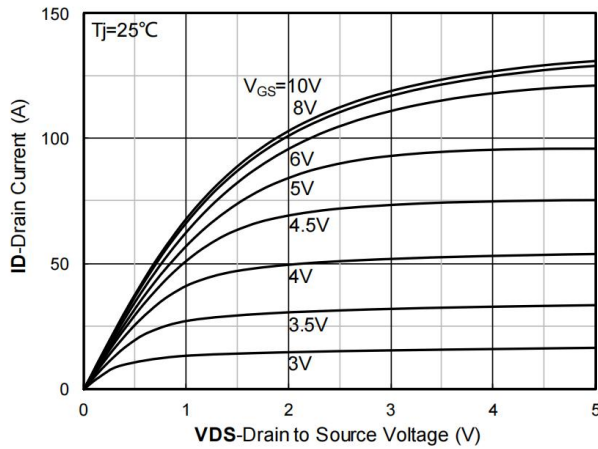


Figure 1. Output Characteristics; typical values

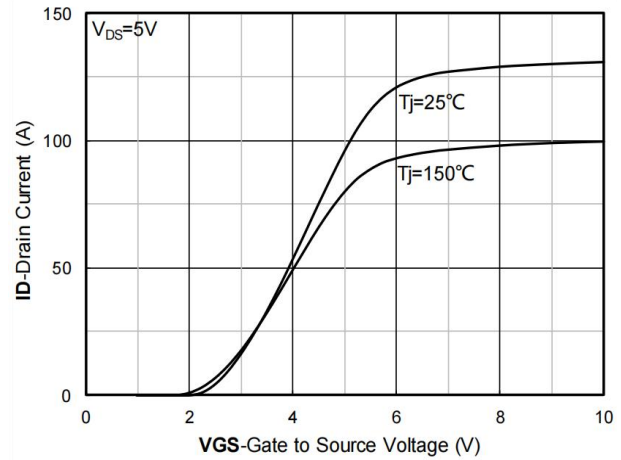


Figure 2. Transfer Characteristics; typical values

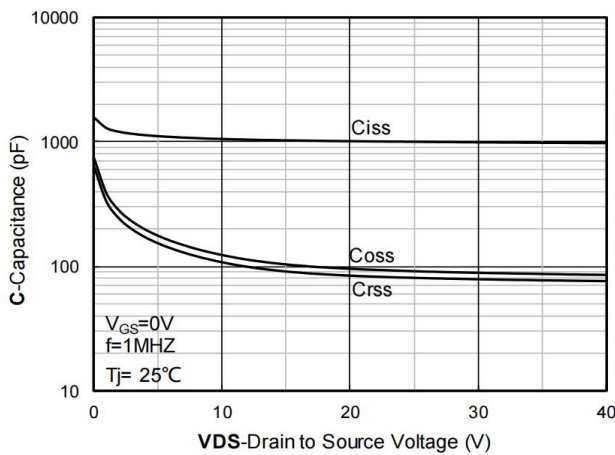


Figure 3. Capacitance Characteristics; typical values

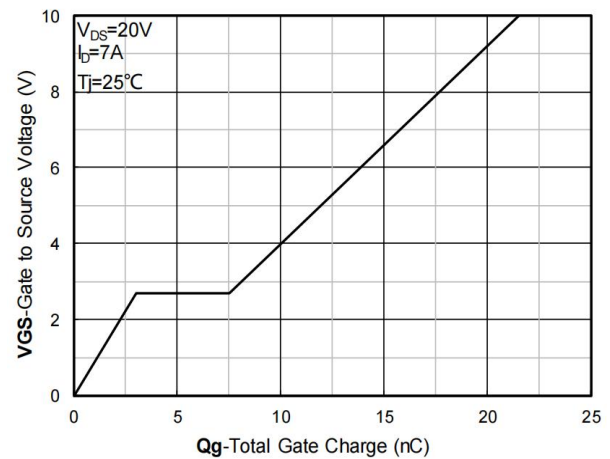


Figure 4. Gate Charge; typical values

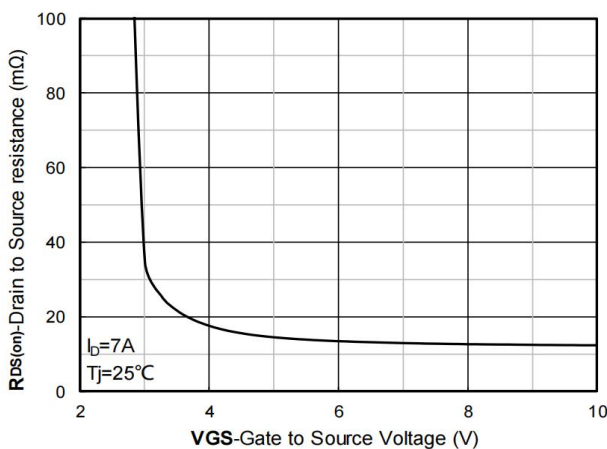


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

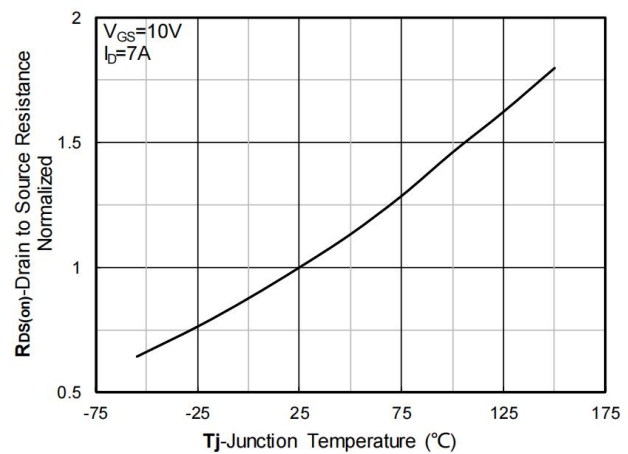


Figure 6 . Normalized On-Resistance

N-Channel Typical Characteristics

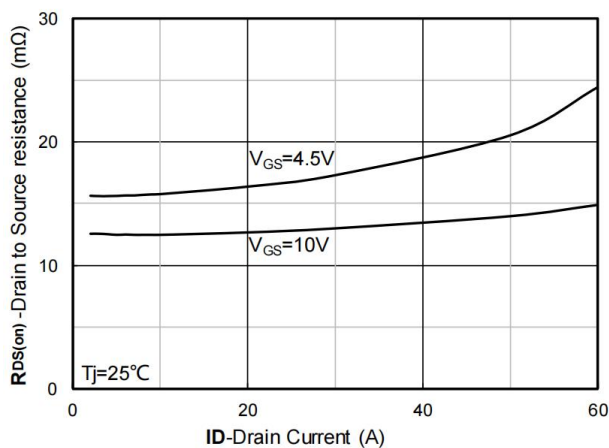


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

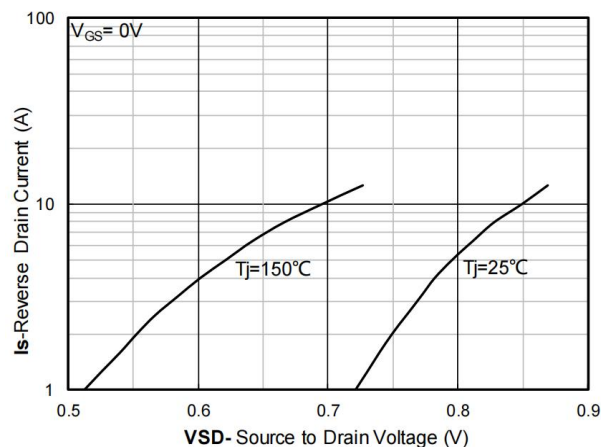


Figure 8. Forward characteristics of reverse diode; typical values

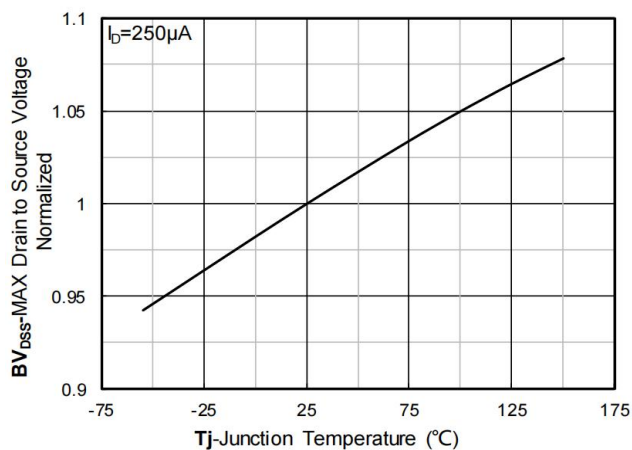


Figure 9. Normalized breakdown voltage

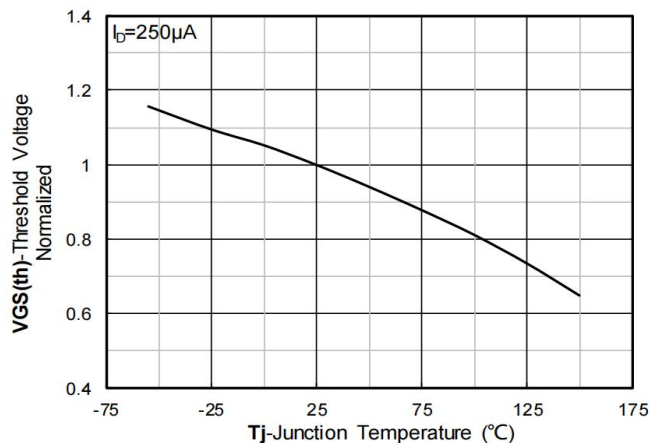


Figure 10. Normalized Threshold voltage

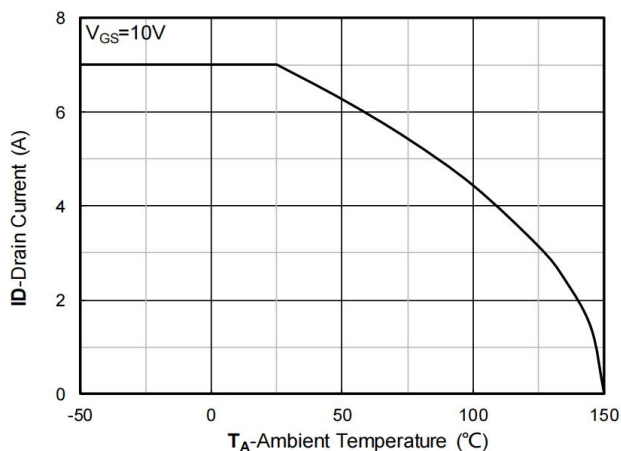


Figure 11. Current dissipation

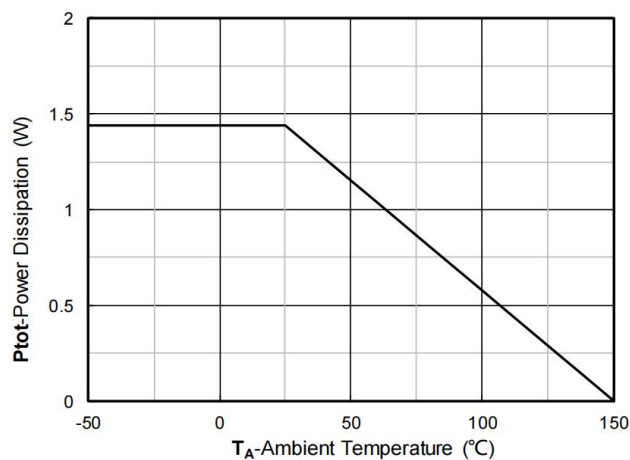


Figure 12. Power dissipation

N-Channel Typical Characteristics

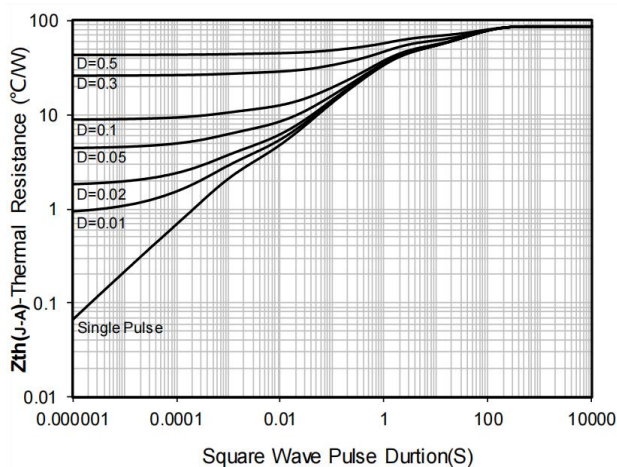


Figure 13. Maximum Transient Thermal Impedance

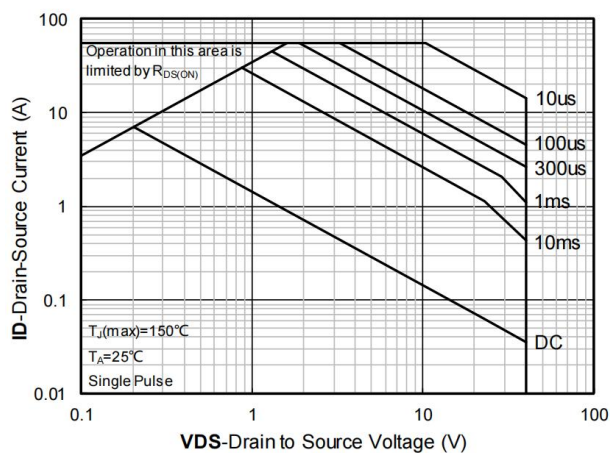


Figure 14. Safe Operation Area

P-Channel Typical Characteristics

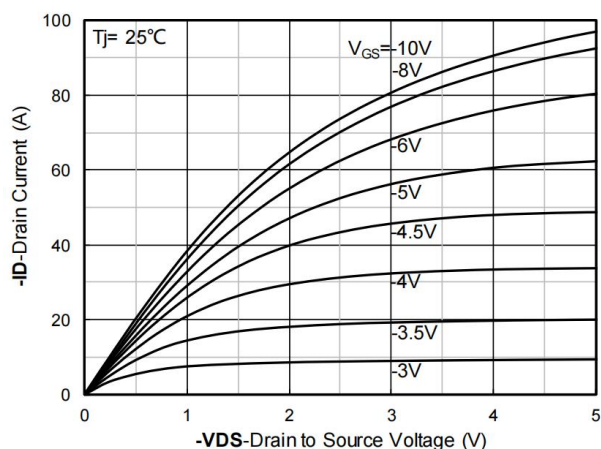


Figure 1. Output Characteristics; typical values

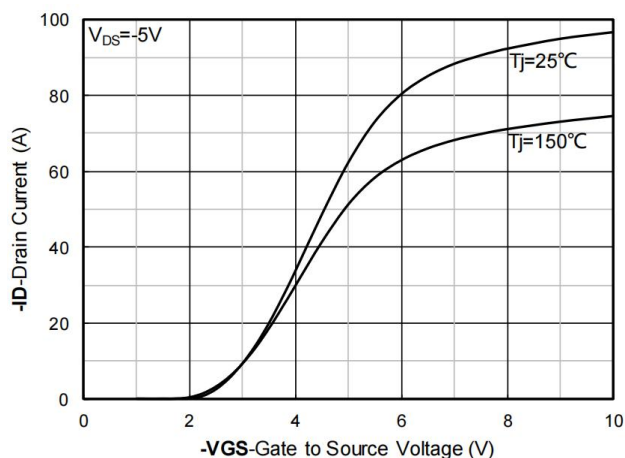


Figure 2. Transfer Characteristics; typical values

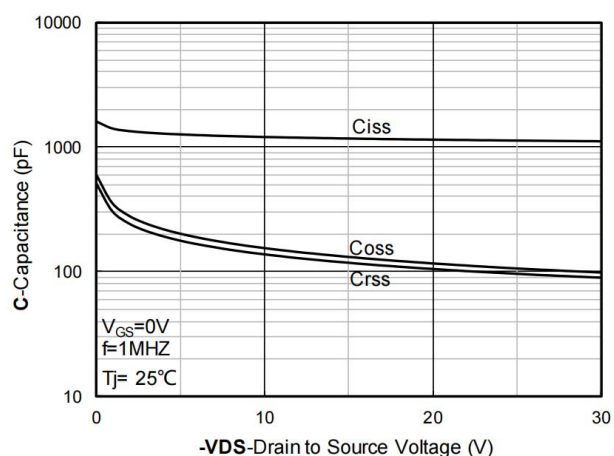


Figure 3. Capacitance Characteristics; typical values

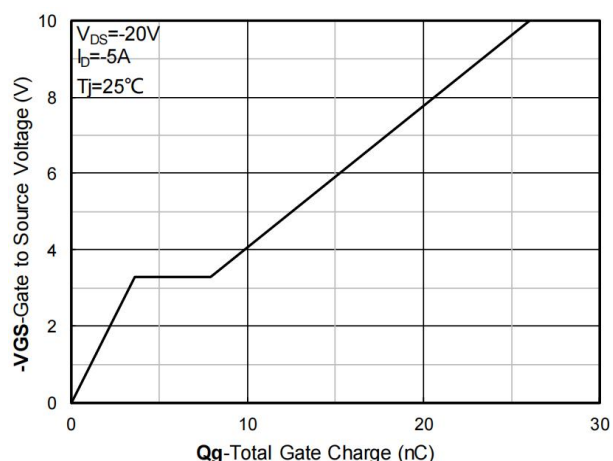


Figure 4. Gate Charge; typical values

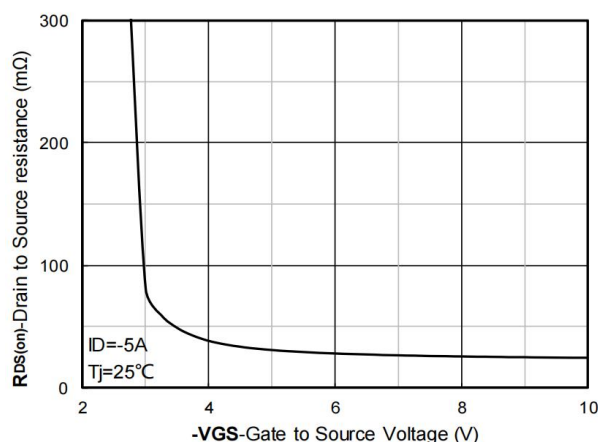


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

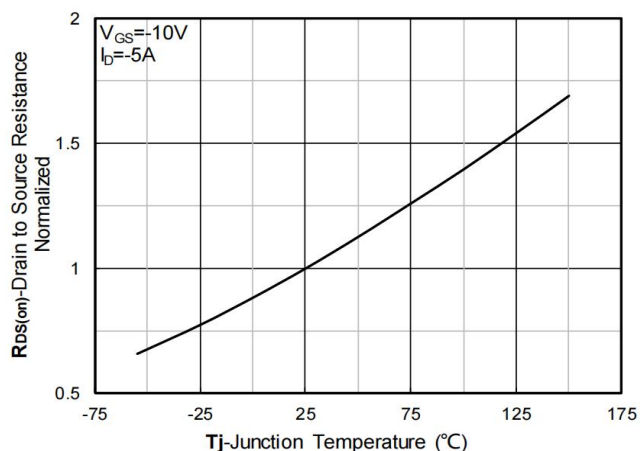


Figure 6 . Normalized On-Resistance

P-Channel Typical Characteristics

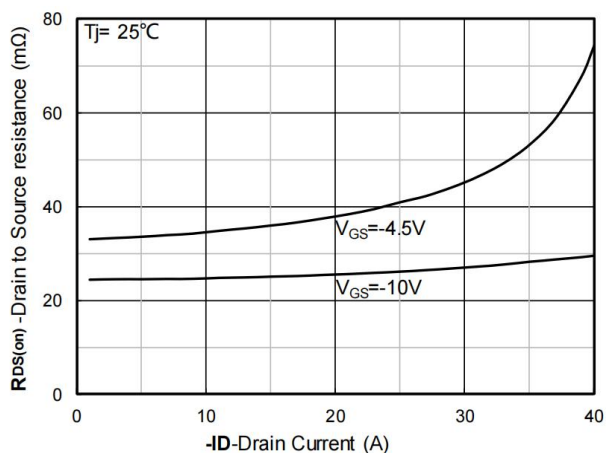


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

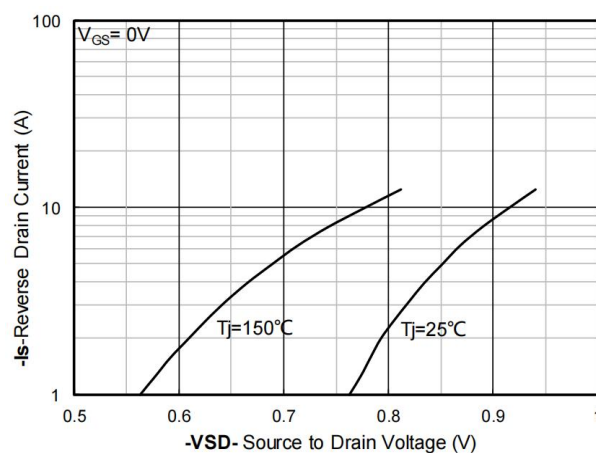


Figure 8. Forward characteristics of reverse diode; typical values

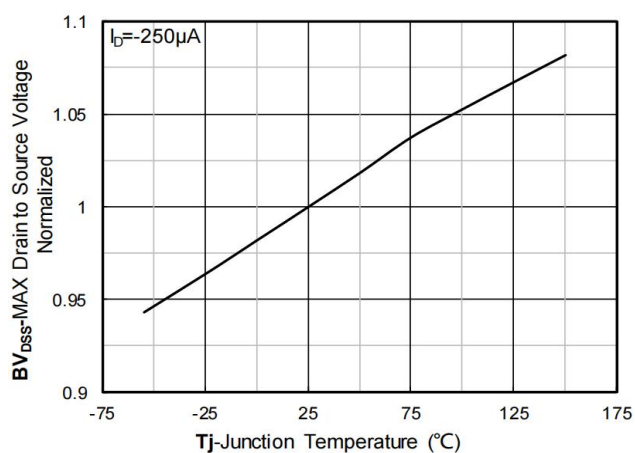


Figure 9. Normalized breakdown voltage

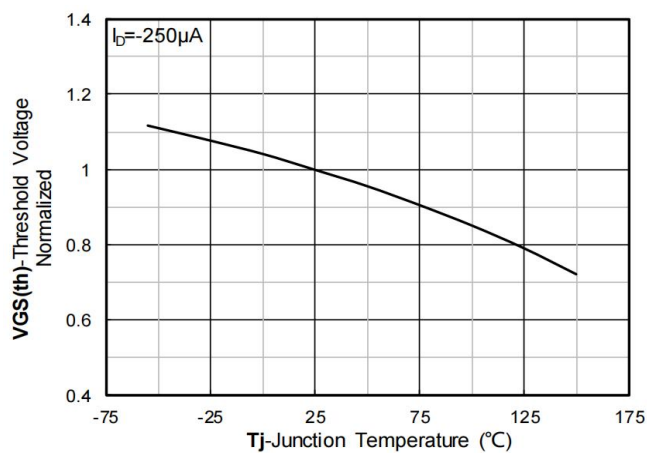


Figure 10. Normalized Threshold voltage

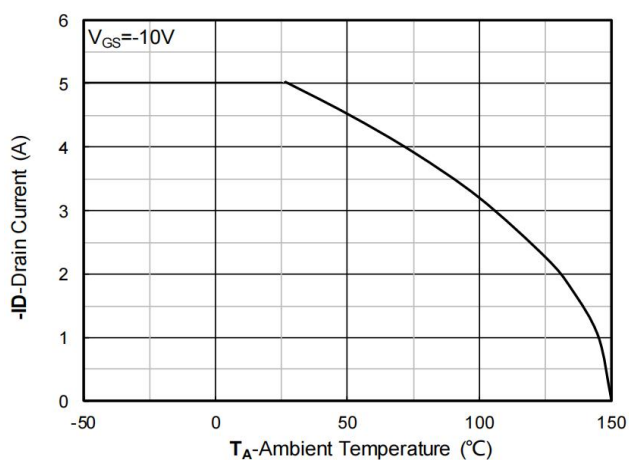


Figure 11. Current dissipation

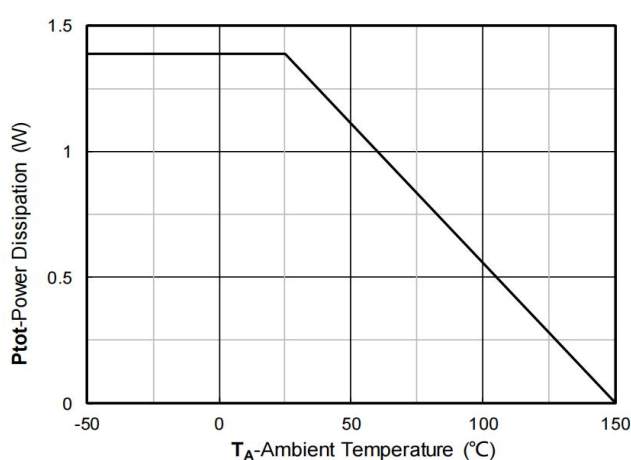


Figure 12. Power dissipation

P-Channel Typical Characteristics

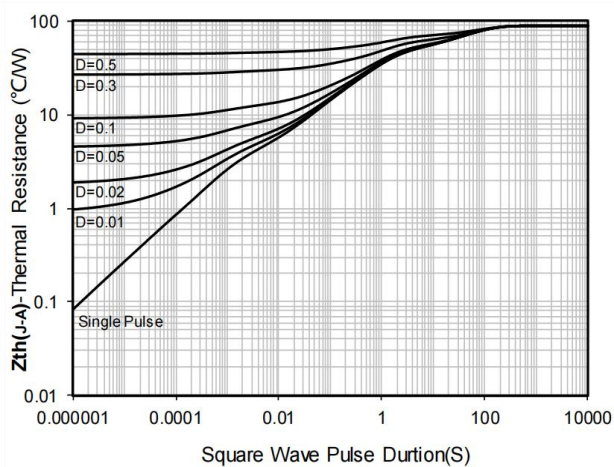


Figure 13. Maximum Transient Thermal Impedance

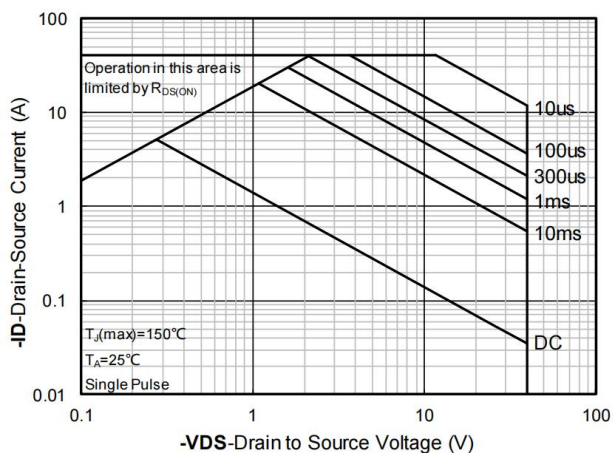
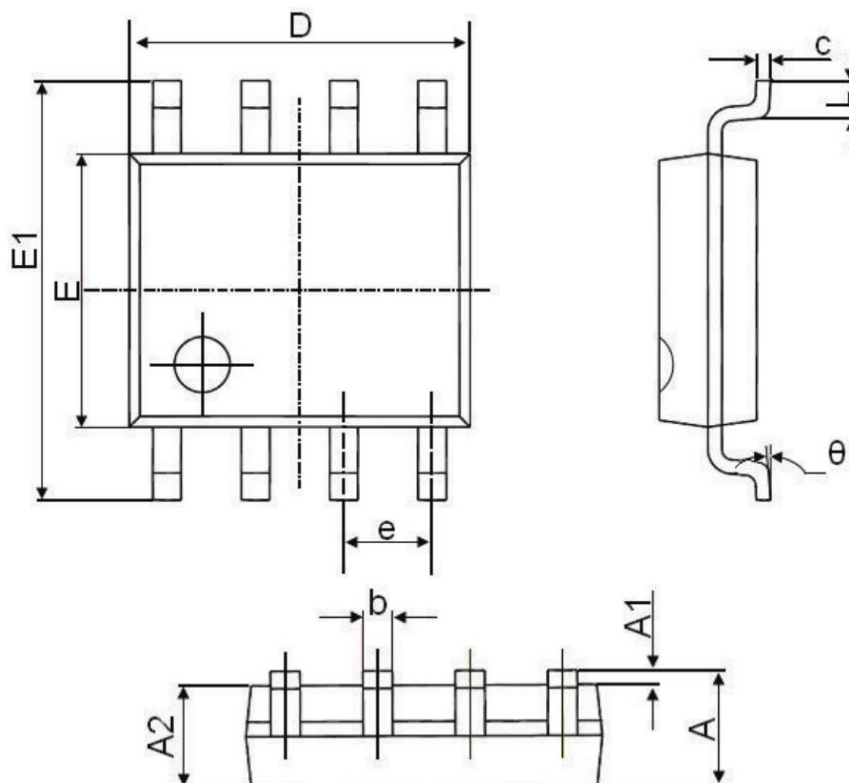


Figure 14. Safe Operation Area

SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 BSC.		0.050 BSC.	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°