AS4606DL-Q1

N and P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
30V	18mΩ@10V	28A
	30mΩ@4.5V	

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-30V	40mΩ@-10V	-20A
	60mΩ@-4.5V	

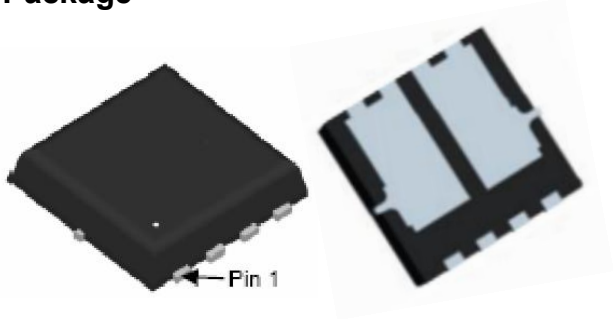
Feature

- High density cell design for ultra low Rdson
- Trench Power LV MOSFET technology
- High Speed switching
- Suffix "-Q1" for AEC-Q101

Application

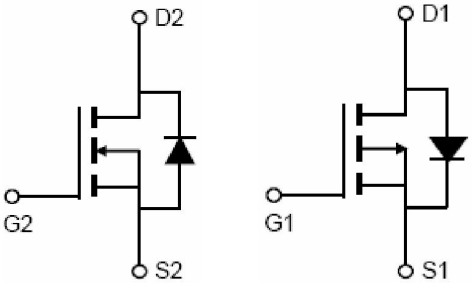
- Wireless charger
- Load switching
- Power management

Package



DFN3.3X3.3-8L

Circuit diagram



Marking

AS4606DL-Q1

N and P-Channel Enhancement Mode MOSFET

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

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current（T_C=25℃）	I_D	28	-20	A
Continuous Drain Current（T_C=100℃）	I_D（100℃）	17.5	-12	A
Pulsed Drain Current[1)]	I_{DM}	60	-40	A
Avalanche energy[2)]	E_{AS}	16	16	mJ
Power Dissipation[3)]（T_C=25℃）	P_D	27	27	W
Thermal Resistance from Junction to Case[4)]	$R_{\theta JC}$	4.5	4.5	℃/W
Junction Temperature	T_J	150	150	℃
Storage Temperature	T_{STG}	-55 ~ +150	-55 ~ +150	℃

N-CH Electrical characteristics (T_J=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	30			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =30V,V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1.0	1.5	2.2	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =14A		14	18	mΩ
		V_{GS} =4.5V, I_D =5A		23	30	
Dynamic characteristics[5)]						
Input Capacitance	C_{iss}	V_{DS} =15V,V_{GS} =0V,f =1MHz		380		pF
Output Capacitance	C_{oss}			75		
Reverse Transfer Capacitance	C_{rss}			60		
Total Gate Charge	Q_g	V_{DS} =15V,V_{GS} =10V,I_D =10A		12.5		nC
Gate-Source Charge	Q_{gs}			2.8		
Gate-Drain Charge	Q_{gd}			2.5		
Turn-on delay time	$t_{d(on)}$	V_{DD}=15V,V_{GS}=10V , I_D =10A,R_{GEN}=3Ω		5		nS
Turn-on rise time	t_r			31		
Turn-off delay time	$t_{d(off)}$			15		
Turn-off fall time	t_f			23		
Source-Drain Diode characteristics						
Diode Continuous Current	I_S				28	A
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S=14A			1.2	V
Reverse Recovery Charge	Q_{rr}	I_F=10A, di/dt=100A/us		1.7		nC
Reverse Recovery Time	t_{rr}			18		nS

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	-30			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-30V,V_{GS} = 0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1.0	-1.5	-2.4	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =-10V, I_D =-10A		31	40	mΩ
		V_{GS} =-4.5V, I_D =-5A		45	60	
Dynamic characteristics[5]						
Input Capacitance	C_{iss}	V_{DS} =-15V,V_{GS} =0V,f =1MHz		490		pF
Output Capacitance	C_{oss}			75		
Reverse Transfer Capacitance	C_{rss}			60		
Total Gate Charge	Q_g	V_{DS} =-15V,V_{GS} =-10V, I_D =-10A		9		nC
Gate-Source Charge	Q_{gs}			2.5		
Gate-Drain Charge	Q_{gd}			2.3		
Turn-on delay time	$t_{d(on)}$	V_{DD}=-15V,V_{GS}=-10V, I_D =-10A,R_{GEN}=2.5Ω		9		nS
Turn-on rise time	t_r			3.5		
Turn-off delay time	$t_{d(off)}$			30		
Turn-off fall time	t_f			18		
Source-Drain Diode characteristics						
Diode Continuous Current	I_S				-20	A
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S=-10A			-1.2	V
Reverse Recovery Charge	Q_{rr}	I_F=-10A, di/dt=100A/us		15		nC
Reverse Recovery Time	t_{rr}			35		nS

Notes:

1) Repetitive rating; pulse width limited by max. junction temperature.

2) NMOS: T_J=25℃, V_{DD}=25V, V_{GS}=10V, R_G=25Ω, L=0.5mH, I_{AS}=8A.PMOS: T_J=25℃, V_{DD}=-25V, V_{GS}=-10V, R_G=25Ω, L=0.5mH, I_{AS}=-8A.

3) Pd is based on max. junction temperature, using junction-case thermal resistance.

4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in the still air environment with T_A =25℃. The maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design.

5) Guaranteed by design, not subject to production.

N- Channel Typical Characteristics

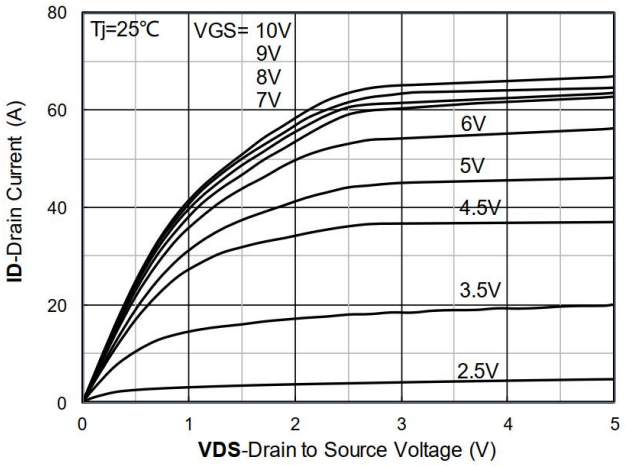


Figure 1. Output Characteristics

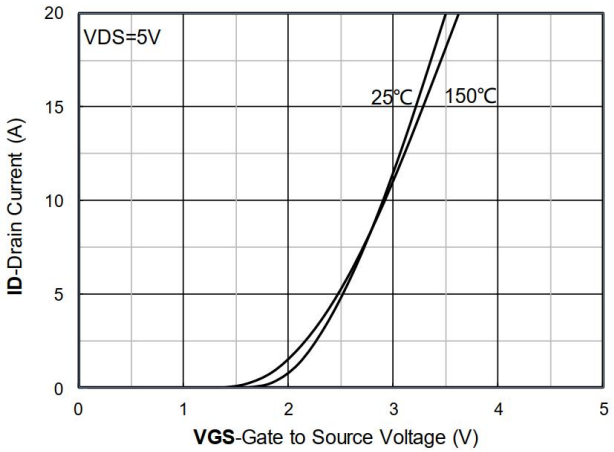


Figure 2. Transfer Characteristics

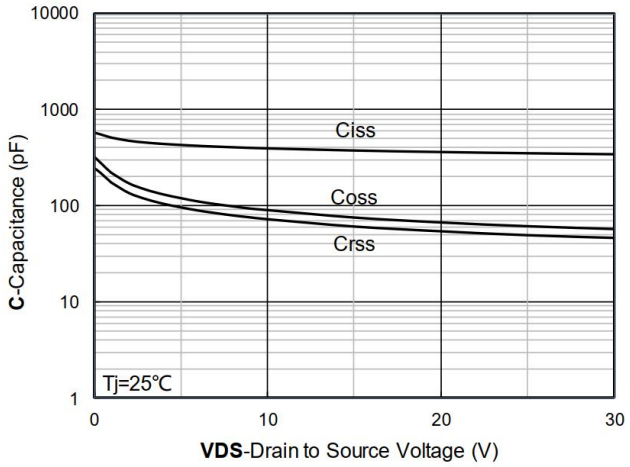


Figure 3. Capacitance Characteristics

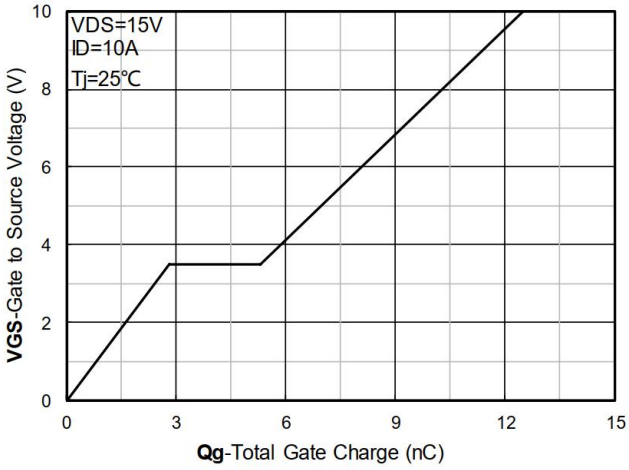


Figure 4. Gate Charge

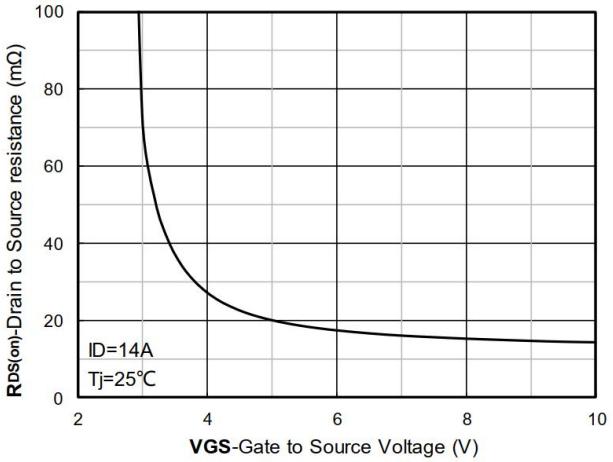


Figure 5. On-Resistance vs Gate to Source Voltage

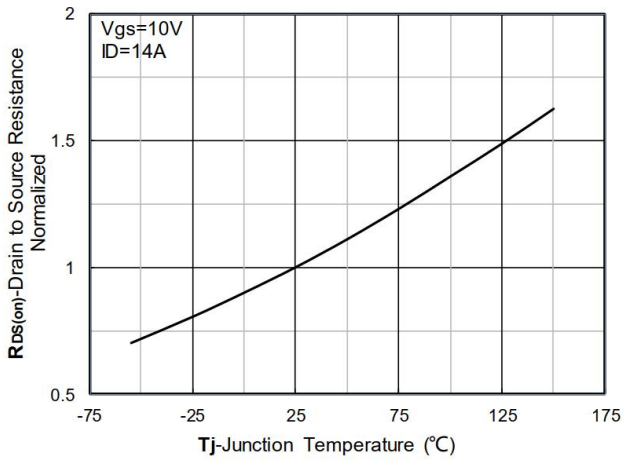


Figure 6. Normalized On- Resistance

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AS-1150294	2018/03/03	2024/07/03	D	9

N- Channel Typical Characteristics

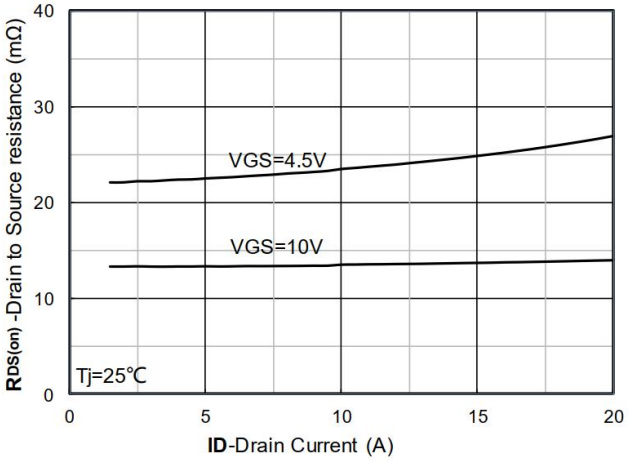


Figure 7. RDS(on) VS Drain Current

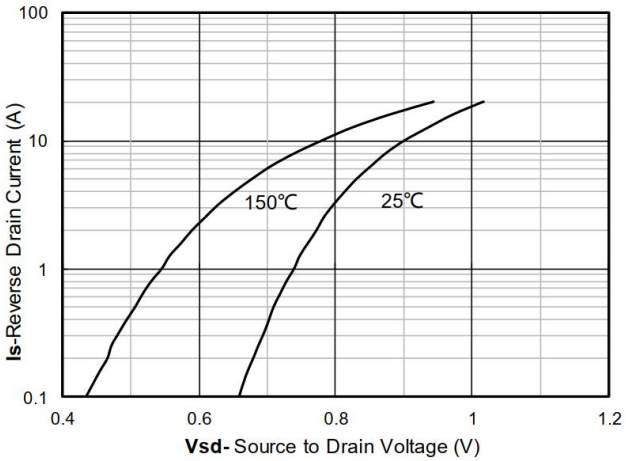


Figure 8. Forward characteristics of reverse diode

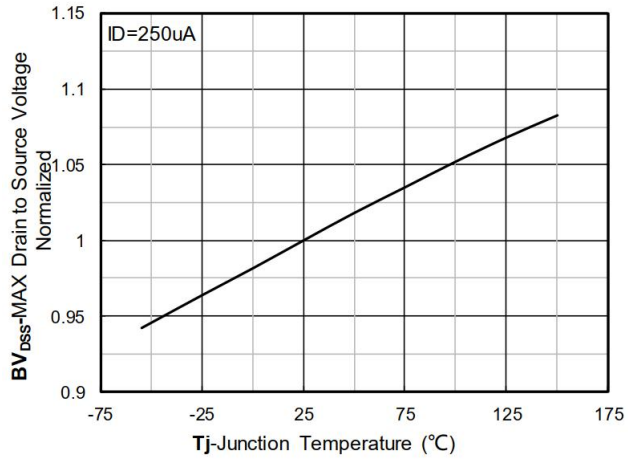


Figure 9. Normalized breakdown voltage

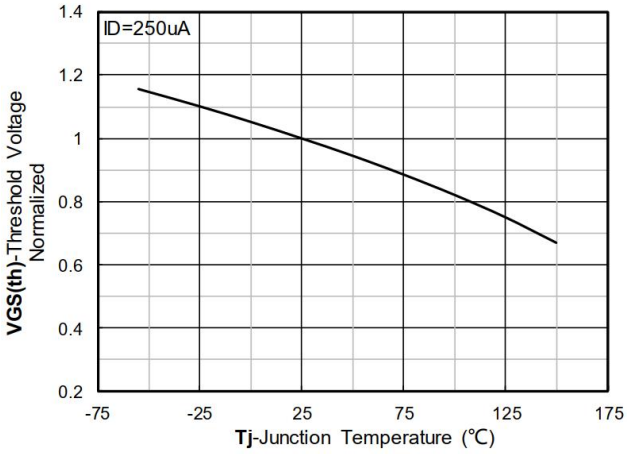


Figure 10. Normalized Threshold voltage

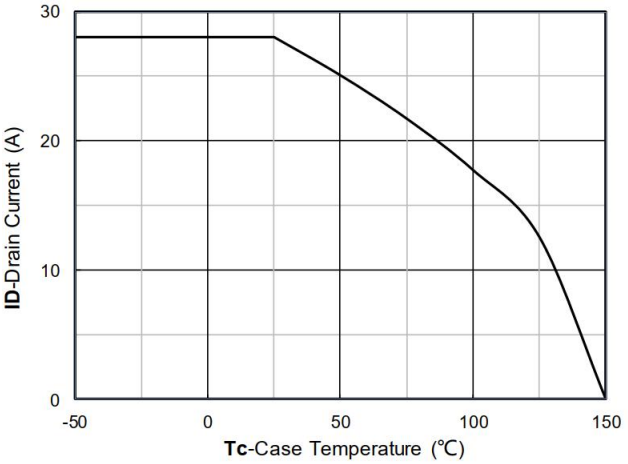


Figure 11. Current dissipation

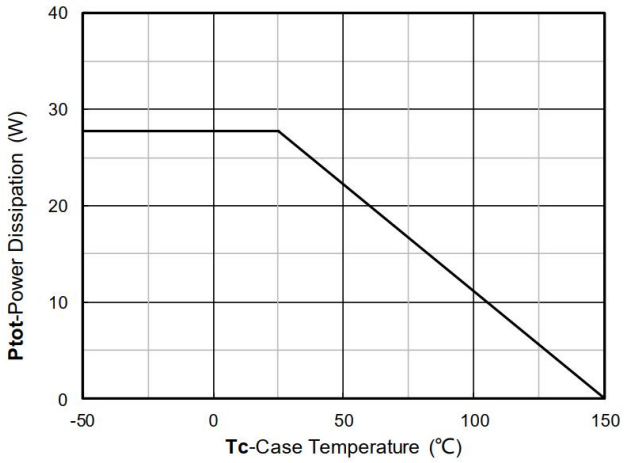


Figure 12. Power dissipation

N- Channel Typical Characteristics

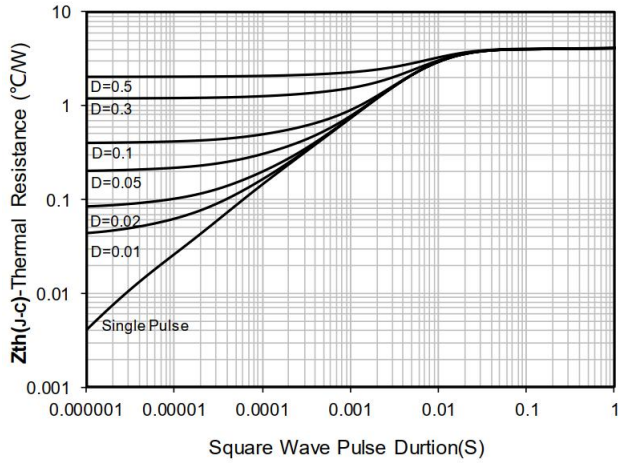


Figure 13. Maximum Transient Thermal Impedance

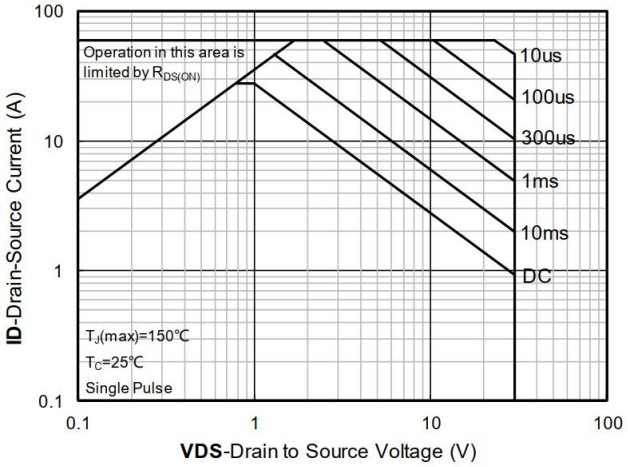


Figure 14. Safe Operation Area

P- Channel Typical Characteristics

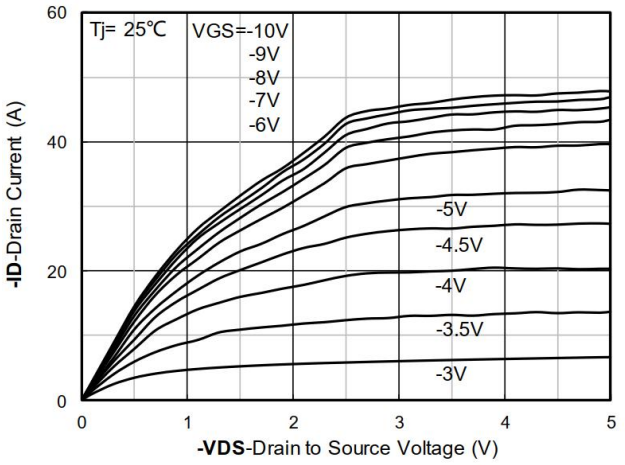


Figure 1. Output Characteristics

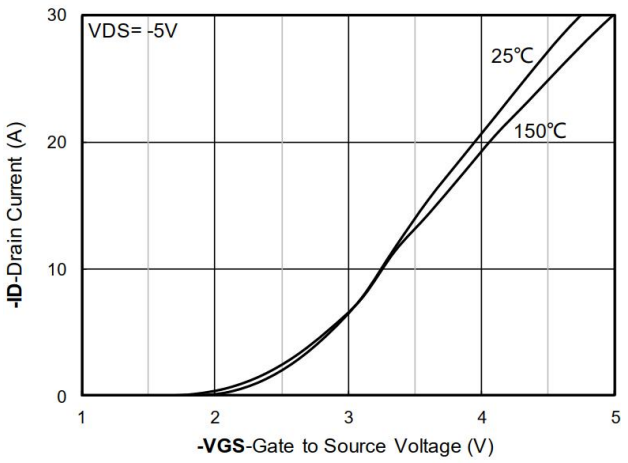


Figure 2. Transfer Characteristics

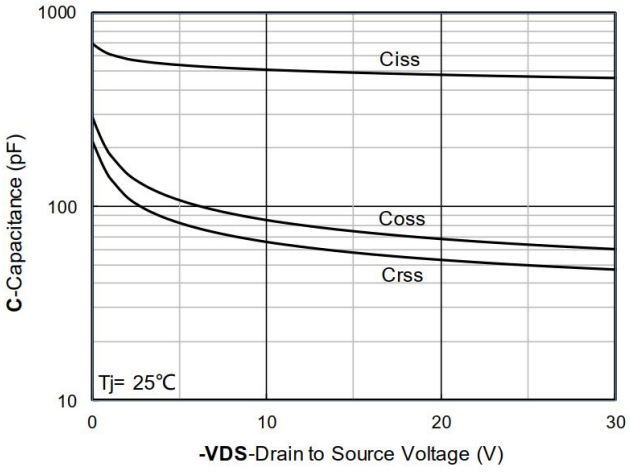


Figure 3. Capacitance Characteristics

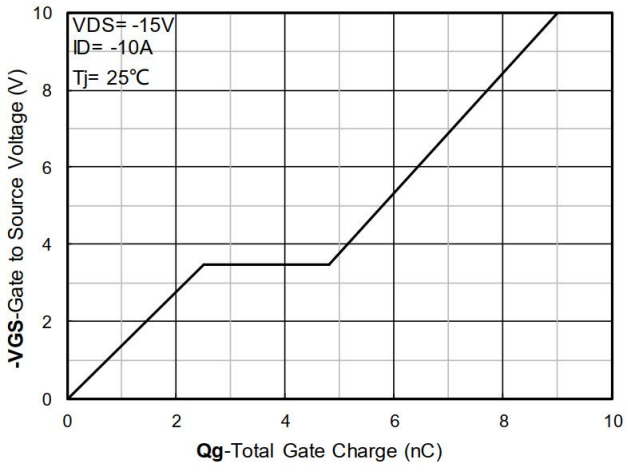


Figure 4. Gate Charge

P- Channel Typical Characteristics

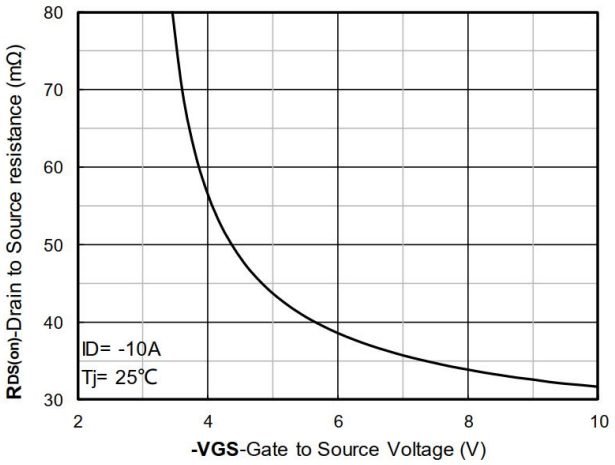


Figure 5. On-Resistance vs Gate to Source Voltage

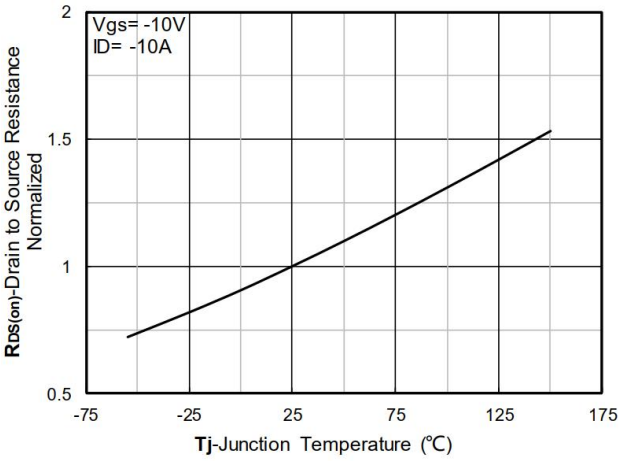


Figure 6. Normalized On-Resistance

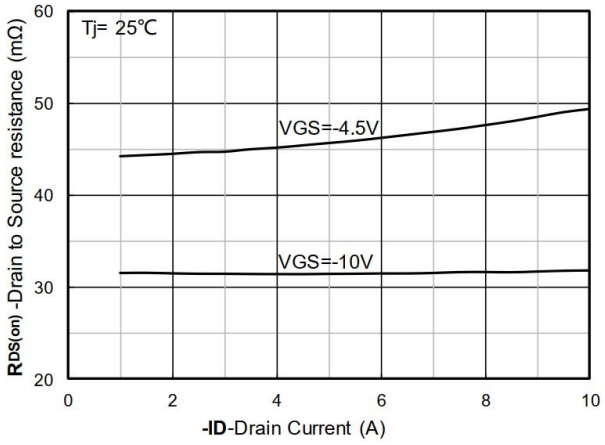


Figure 7. $R_{DS(on)}$ VS Drain Current

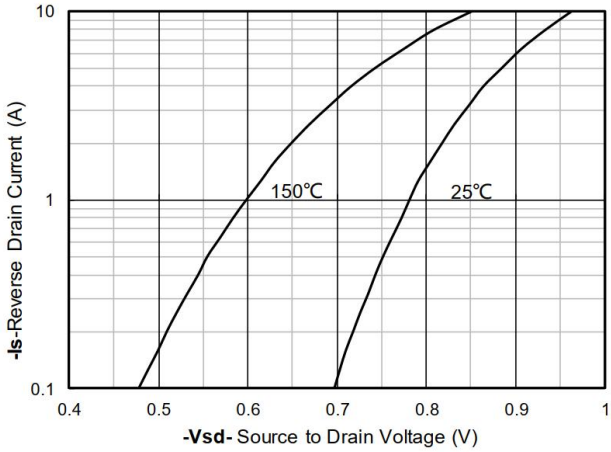


Figure 8. Forward characteristics of reverse diode

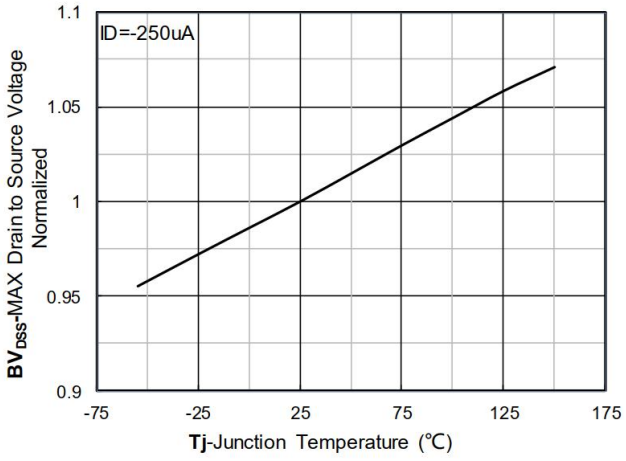


Figure 9. Normalized breakdown voltage

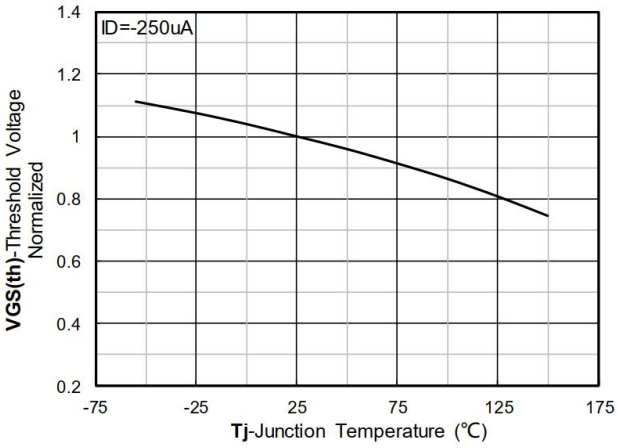


Figure 10. Normalized Threshold voltage

P- Channel Typical Characteristics

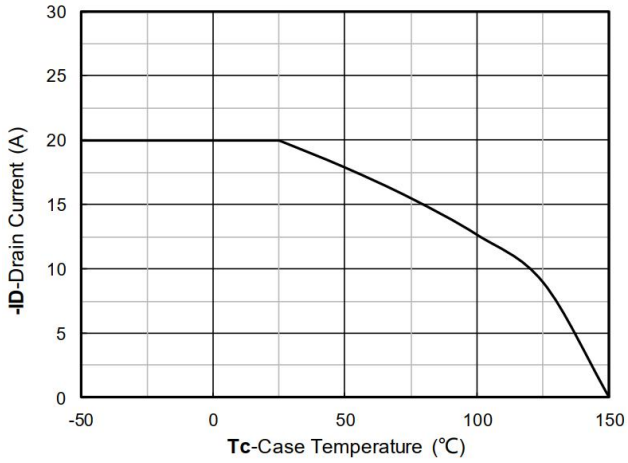


Figure 11. Current dissipation

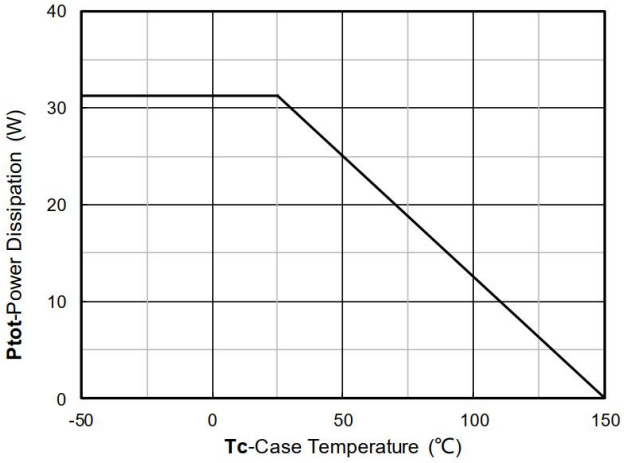


Figure 12. Power dissipation

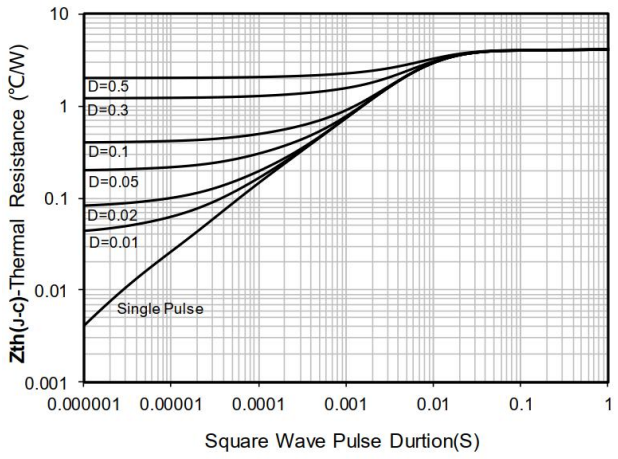


Figure 13. Maximum Transient Thermal Impedance

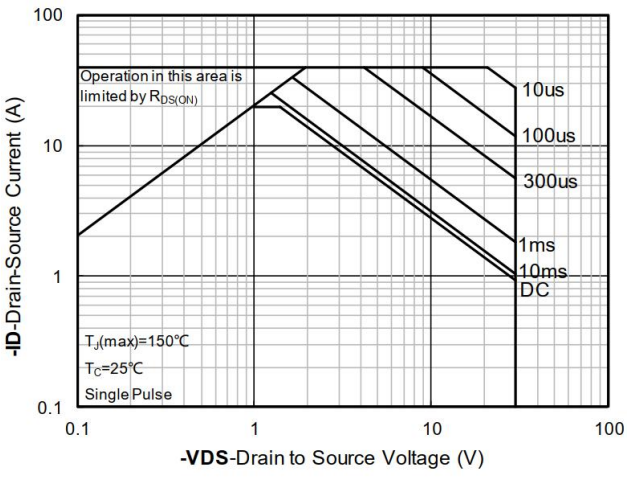
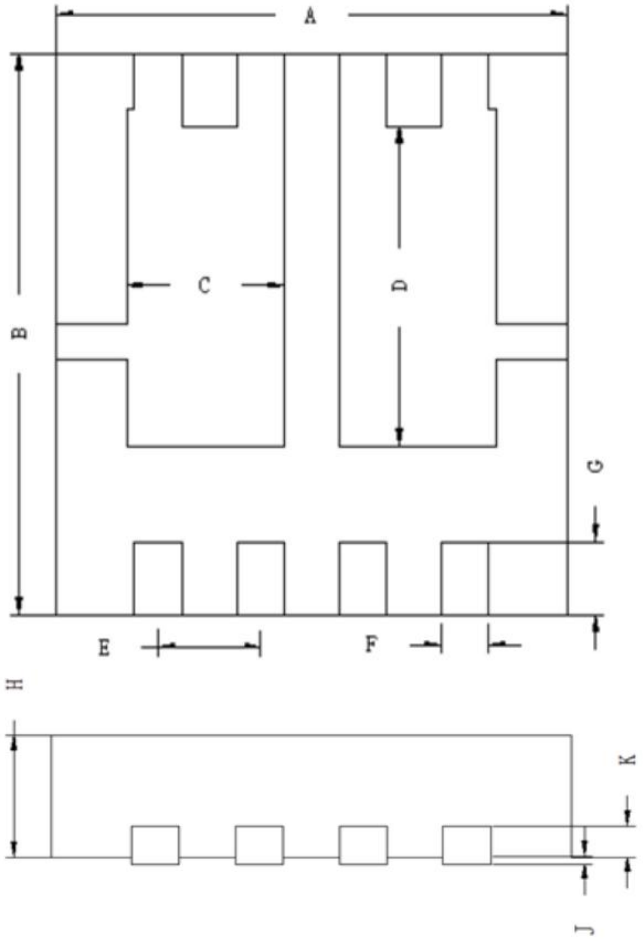


Figure 14. Safe Operation Area

DFN3.3X3.3-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	3.150	3.350	0.124	0.132
B	3.150	3.350	0.124	0.132
C	0.900	1.100	0.035	0.044
D	1.750	1.950	0.068	0.077
E	0.650 BSC		0.026 BSC	
F	0.200	0.400	0.007	0.016
G	0.325	0.525	0.012	0.021
H	0.700	0.900	0.027	0.036
J	0.100 Max		0.004 Max	
K	0.200 BSC		0.008 BSC	