

AP3910GD

N&P-Channel complementary Power MOSFET

Description

The AP3910GD uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

N channel

- $V_{DS} = 30V, I_D = 36A$
 $R_{DS(ON)} < 12m\Omega @ V_{GS} = 10V$
 $R_{DS(ON)} < 15m\Omega @ V_{GS} = 4.5V$

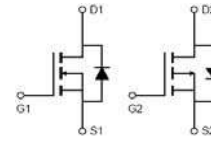
p channel

- $V_{DS} = -30V, I_D = -30A$
 $R_{DS(ON)} < 14m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 20m\Omega @ V_{GS} = -4.5V$

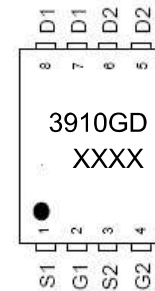
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

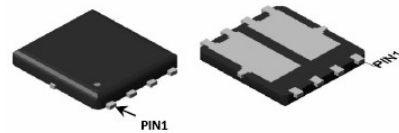
- H-bridge
- Inverters



Schematic diagram



Marking and pin assignment



Top View

Bottom View

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3910GD	AP3910GD	PDFN5*6-8L		-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ 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	I_D	$T_C = 25^\circ C$	36	-30
		$T_C = 100^\circ C$	22.8	-20.2
Pulsed Drain Current ^(Note 1)	I_{DM}	90	-80	A
Maximum Power Dissipation	P_D	35		W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150		$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	3.6	$^\circ C/W$
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N-Channel Electrical Characteristics (T_C=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	30	33	-	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
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	1.3	3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =10A	-	9.5	14	mΩ
		V _{GS} =4.5V, I _D =5A	-	11	20	
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =10A	15	-	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, F=1.0MHz	-	790	-	PF
Output Capacitance	C _{oss}		-	225	-	PF
Reverse Transfer Capacitance	C _{rss}		-	160	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =25V, I _D =1A V _{GS} =10V, R _{GEN} =6Ω	-	30	-	nS
Turn-on Rise Time	t _r		-	20	-	nS
Turn-Off Delay Time	t _{d(off)}		-	100	-	nS
Turn-Off Fall Time	t _f		-	80	-	nS
Total Gate Charge	Q _g	V _{DS} =15V, I _D =10A, V _{GS} =5V	-	13	-	nC
Gate-Source Charge	Q _{gs}		-	5.5	-	nC
Gate-Drain Charge	Q _{gd}		-	3.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =10A	-	-	1.2	V

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N- Channel Typical Electrical and Thermal Characteristics (Curves)

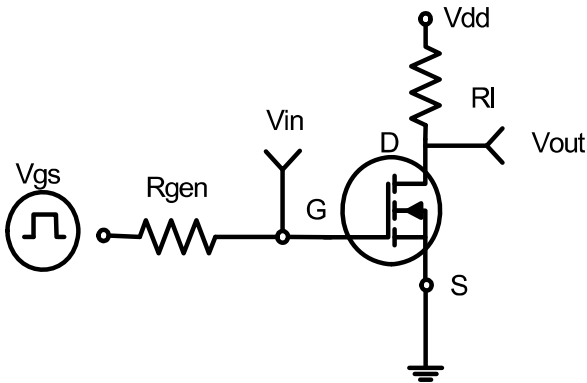


Figure 1: Switching Test Circuit

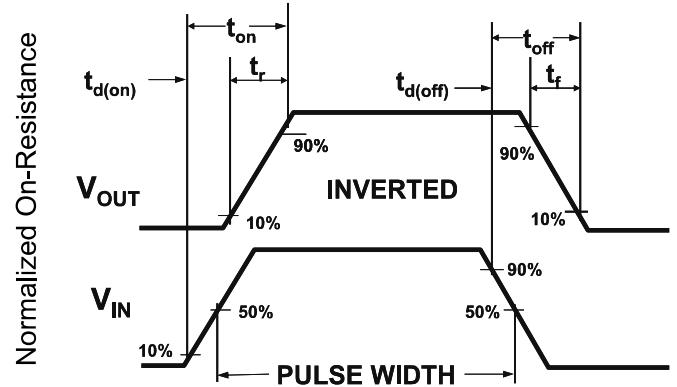


Figure 2: Switching Waveforms

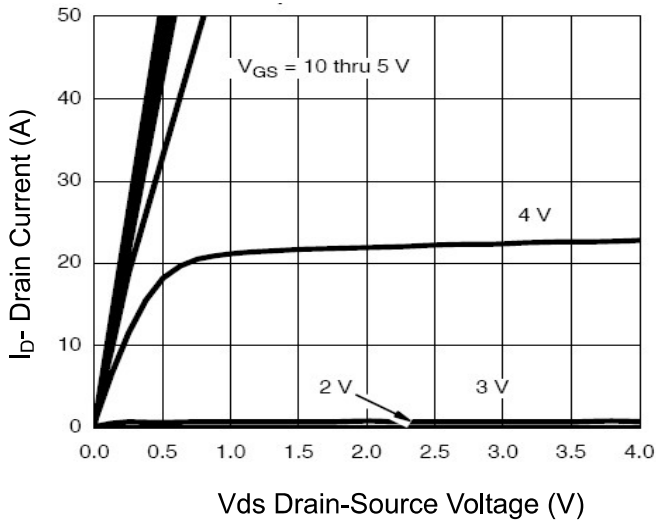


Figure 3 Output Characteristics

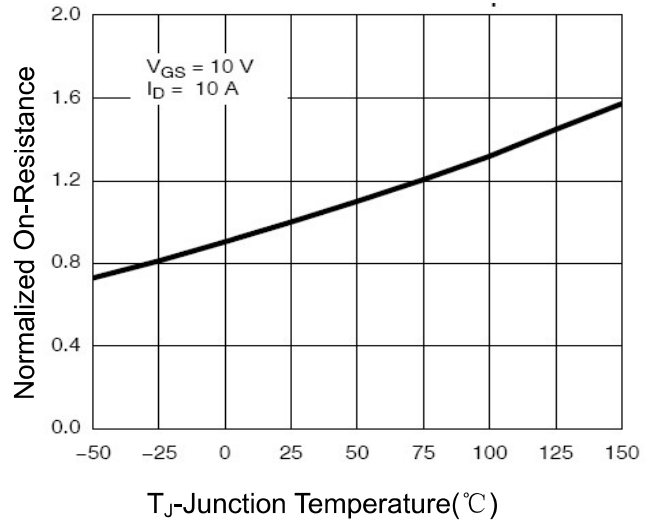


Figure 4 Rds(on)-Junction Temperature

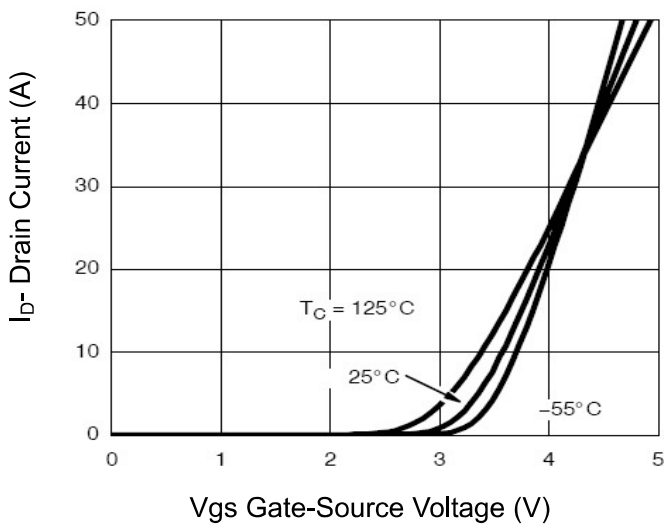


Figure 5 Transfer Characteristics

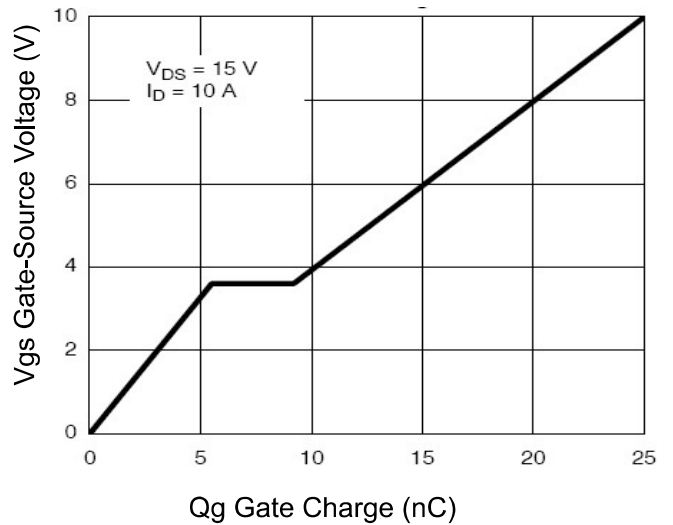
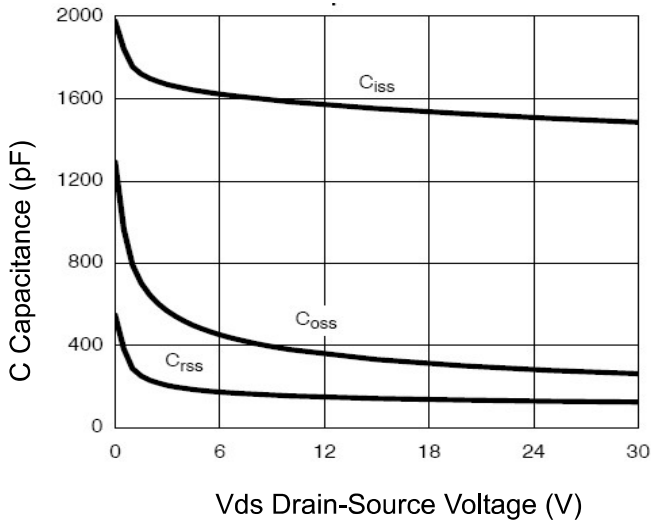


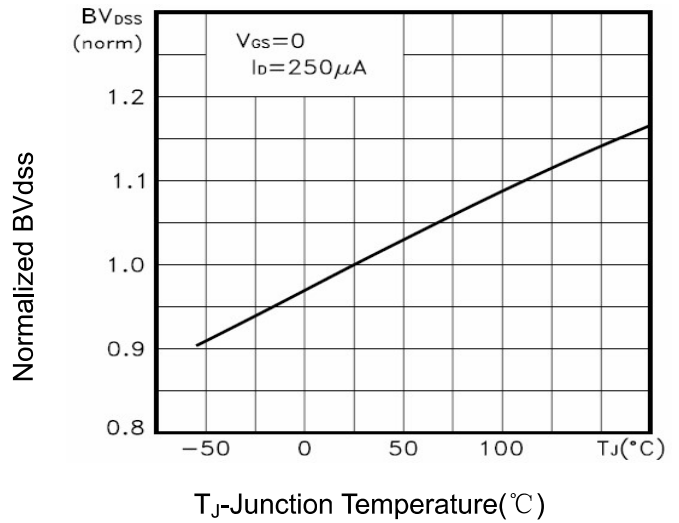
Figure 6 Gate Charge

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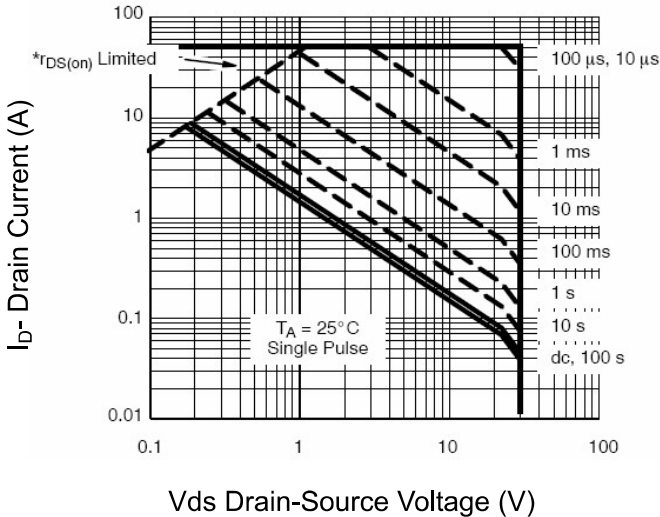
N&P-Channel complementary Power MOSFET



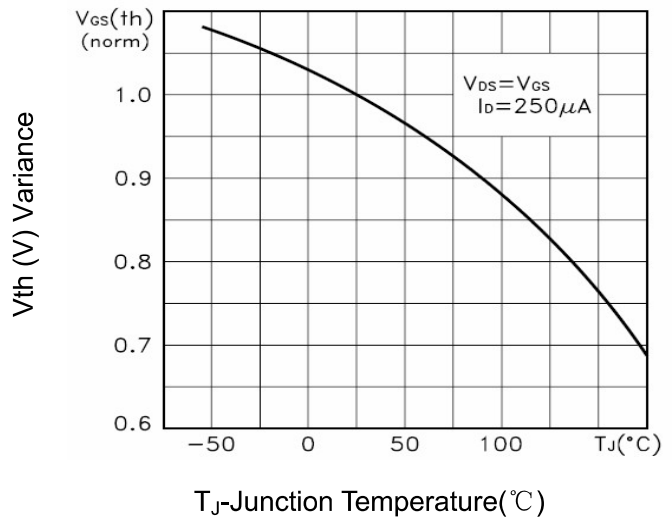
Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



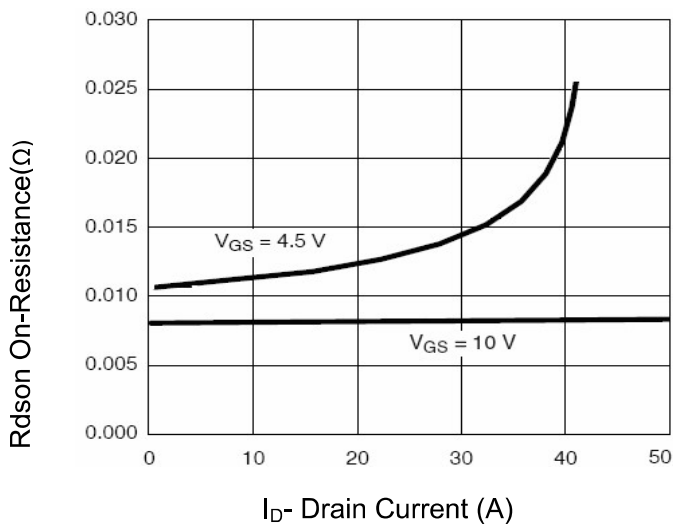
T_J -Junction Temperature($^{\circ}C$)
Figure 8 BV_{DSS} vs Junction Temperature



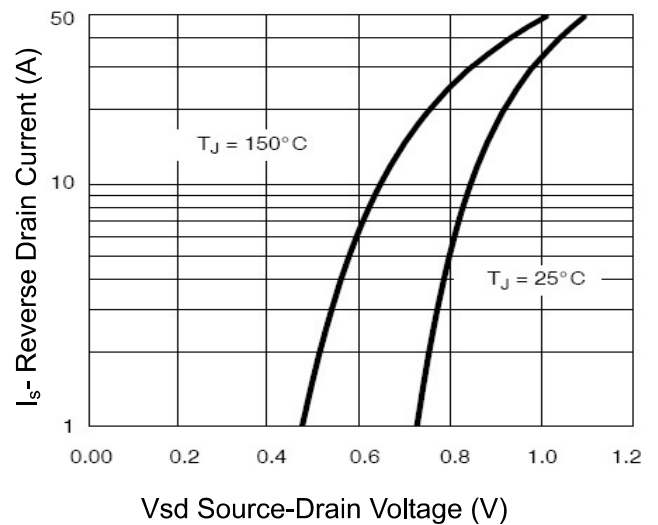
Vds Drain-Source Voltage (V)
Figure 9 Safe Operation Area



T_J -Junction Temperature($^{\circ}C$)
Figure 10 $V_{GS(th)}$ vs Junction Temperature



I_D - Drain Current (A)
Figure 11 R_{dson} - Drain Current



Vsd Source-Drain Voltage (V)
Figure 12 Source- Drain Diode Forward

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P-Channel Electrical Characteristics (T_C=25°C unless otherwise noted)

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
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.0	-1.5	-2.2	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-15A	-	11	14	mΩ
		V _{GS} =-4.5V, I _D =-10A	-	15.5	20	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-15A	30	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{ISS}	V _{DS} =-15V, V _{GS} =0V, F=1.0MHz	-	2800	-	PF
Output Capacitance	C _{OSS}		-	410	-	PF
Reverse Transfer Capacitance	C _{RSS}		-	280	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-15V, I _D =-10A, V _{GS} =-10V, R _{GEN} =3Ω	-	15	-	nS
Turn-on Rise Time	t _r		-	11	-	nS
Turn-Off Delay Time	t _{d(off)}		-	44	-	nS
Turn-Off Fall Time	t _f		-	21	-	nS
Total Gate Charge	Q _g	V _{DS} =-15V, I _D =-10A, V _{GS} =-10V	-	48	-	nC
Gate-Source Charge	Q _{gs}		-	12	-	nC
Gate-Drain Charge	Q _{gd}		-	14	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =-2A	-	-	-1.2	V

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production

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Typical Electrical and Thermal Characteristics

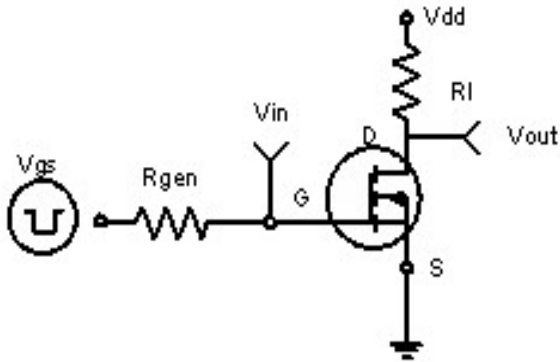


Figure 1 Switching Test Circuit

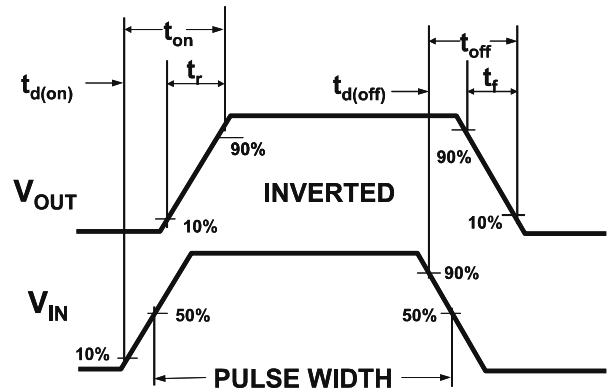


Figure 2 Switching Waveforms

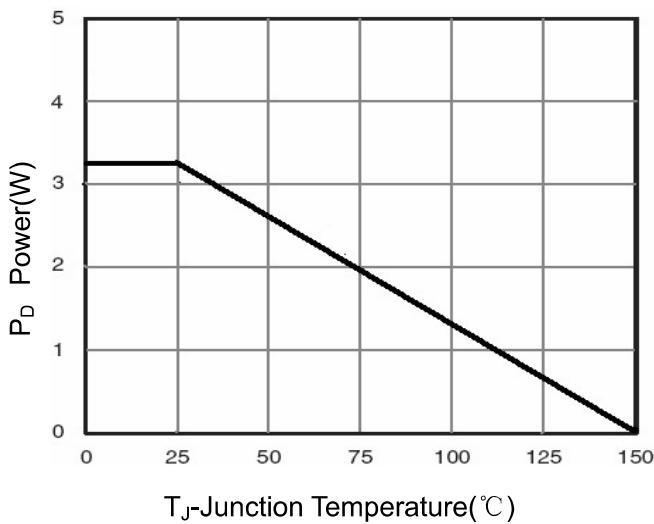


Figure 3 Power Dissipation

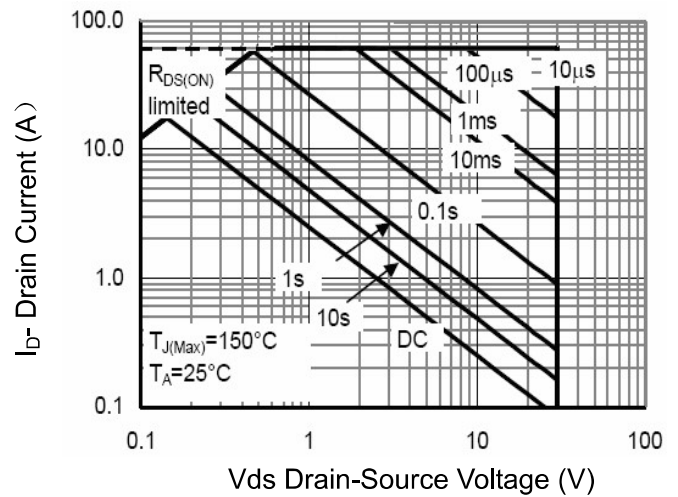


Figure 4 Safe Operation Area

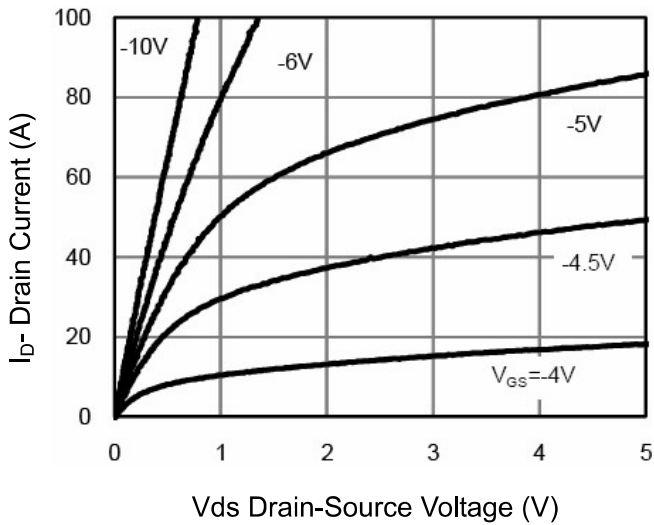


Figure 5 Output Characteristics

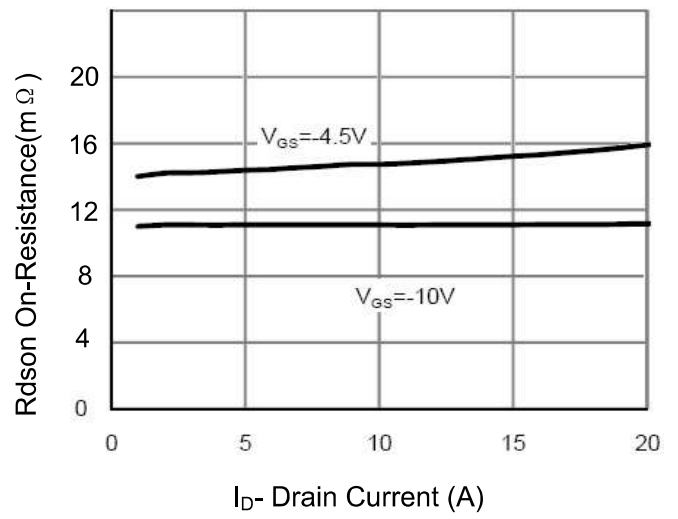


Figure 6 Drain-Source On-Resistance

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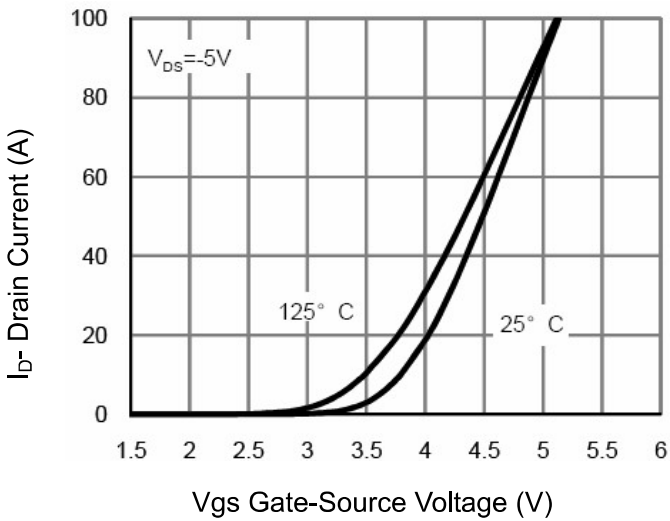


Figure 7 Transfer Characteristics

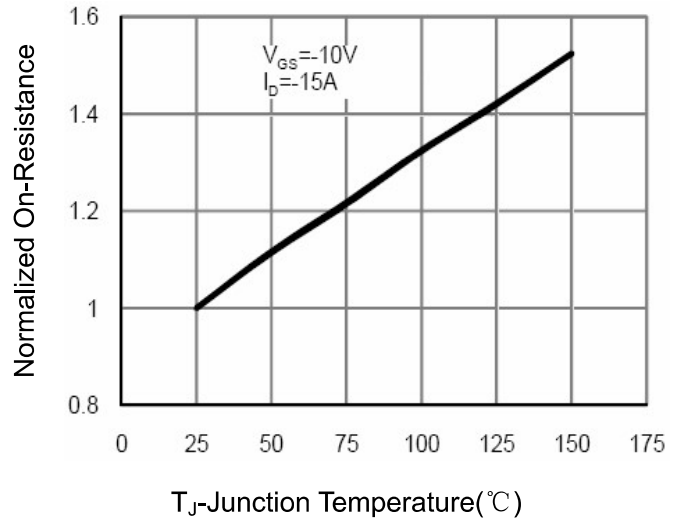


Figure 8 Drain-Source On-Resistance

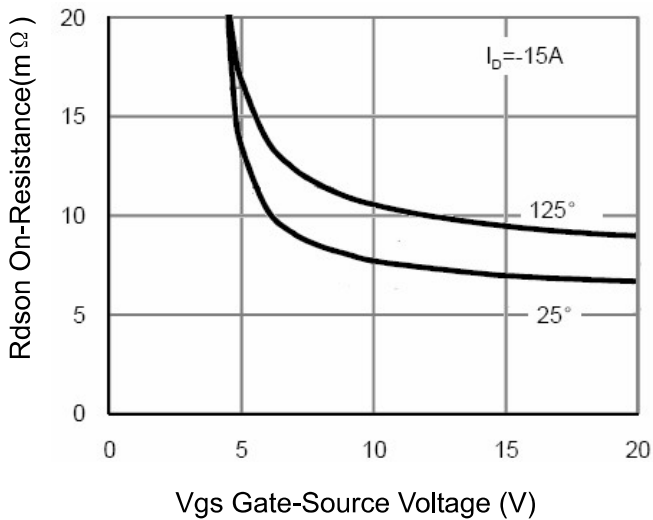


Figure 9 Rdson vs Vgs

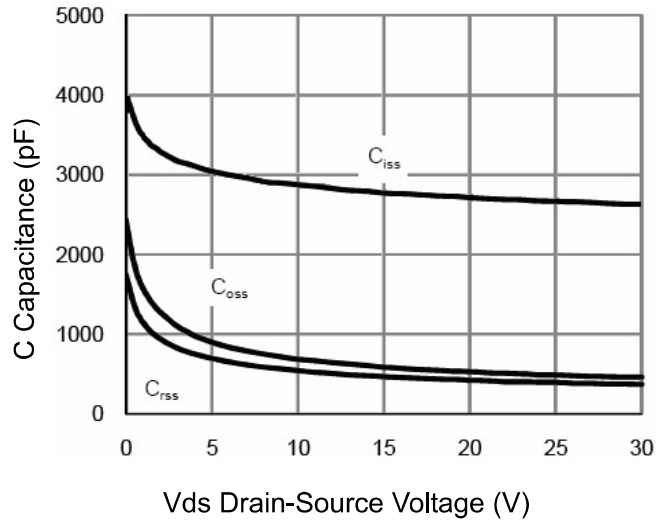


Figure 10 Capacitance vs Vds

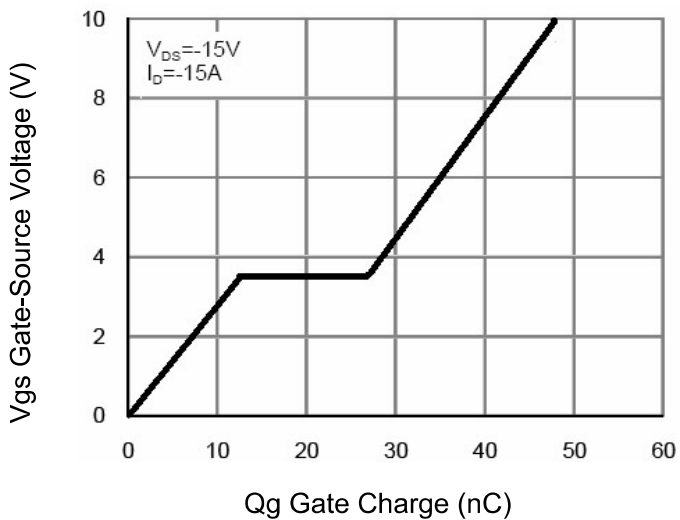


Figure 11 Gate Charge

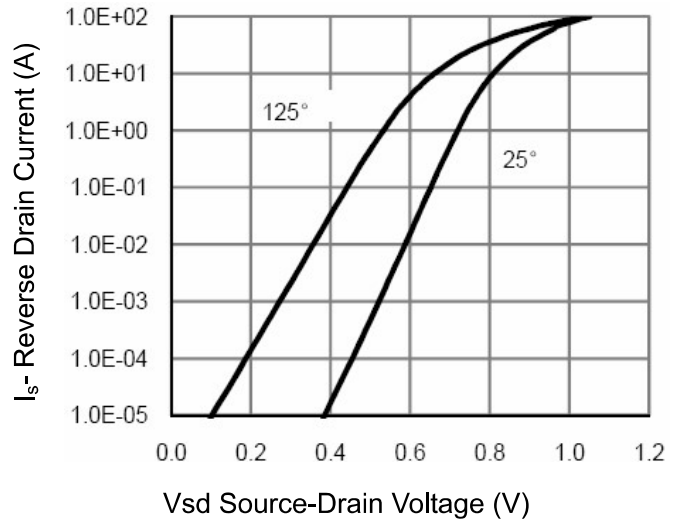
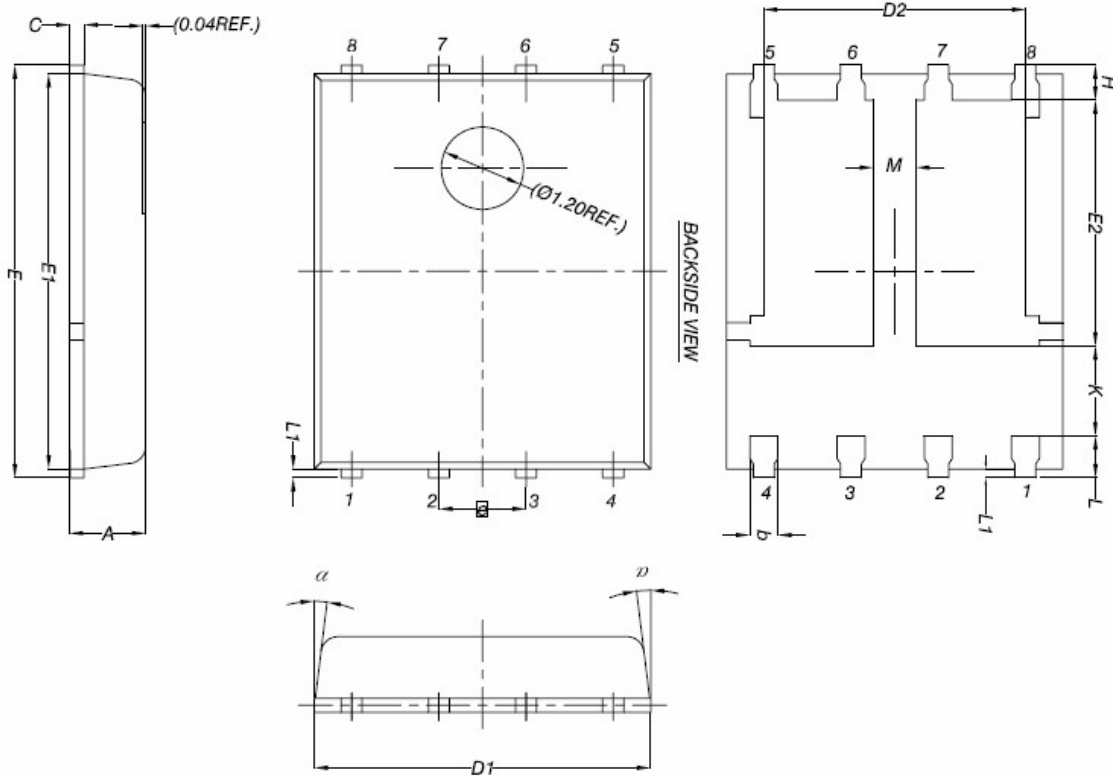


Figure 12 Source- Drain Diode Forward

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DFN5X6-8L Package Information



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
M	0.50	-	-
α	0°	-	12°