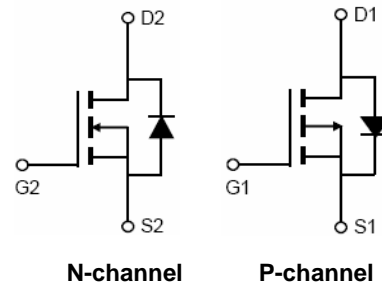


## N and P-Channel Enhancement Mode Power MOSFET

### Description

The FNK8310 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.



Schematic diagram

### General Features

- **N-Channel**

$$V_{DS} = 30V, I_D = 6.5A$$

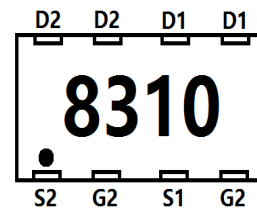
$$R_{DS(ON)} < 32m\Omega @ V_{GS}=10V$$

- **P-Channel**

$$V_{DS} = -30V, I_D = -7A$$

$$R_{DS(ON)} < 45m\Omega @ V_{GS}=-10V$$

- High power and current handling capability
- Lead free product is acquired
- Surface mount package



Marking and pin assignment

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
8310	FNK8310	DFN2x3-8L	Ø330mm	12mm	3000 units

### Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit	
Drain-Source Voltage	$V_{DS}$	30	-30	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$	$\pm 20$	V	
Continuous Drain Current	$I_D$	$T_A=25^\circ\text{C}$	6.5	-7	A
		$T_A=70^\circ\text{C}$	5.4	-5.8	
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	30	-30	A	
Maximum Power Dissipation	$P_D$	2.0	2.0	W	
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	-55 To 150	$^\circ\text{C}$	

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	N-Ch	62.5	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	P-Ch	62.5	$^\circ\text{C/W}$

## N-CH Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

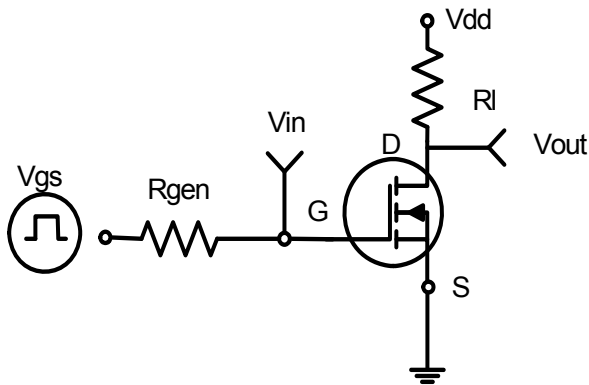
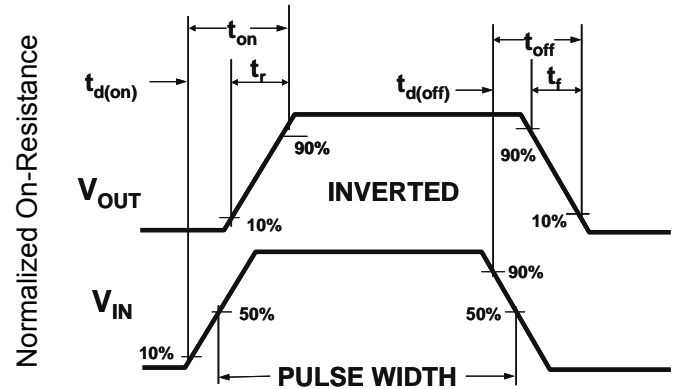
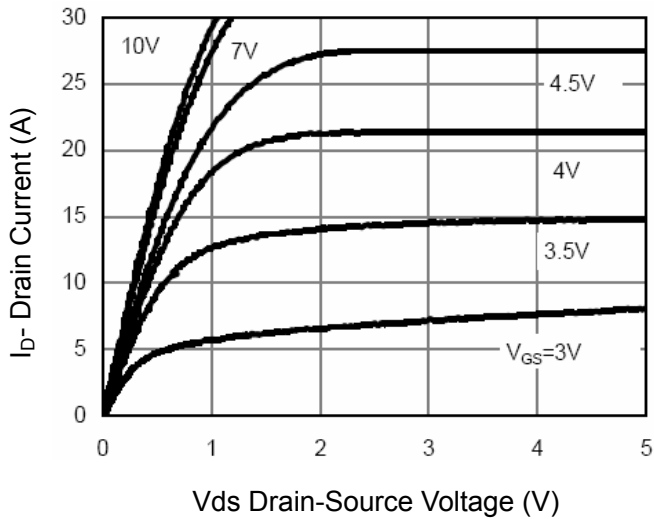
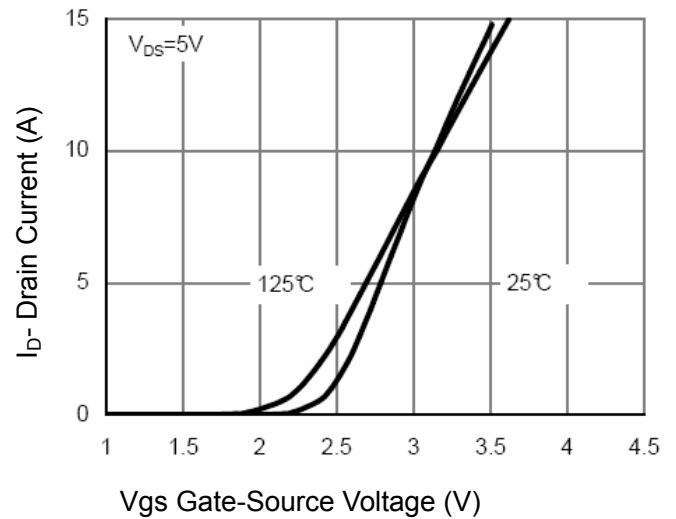
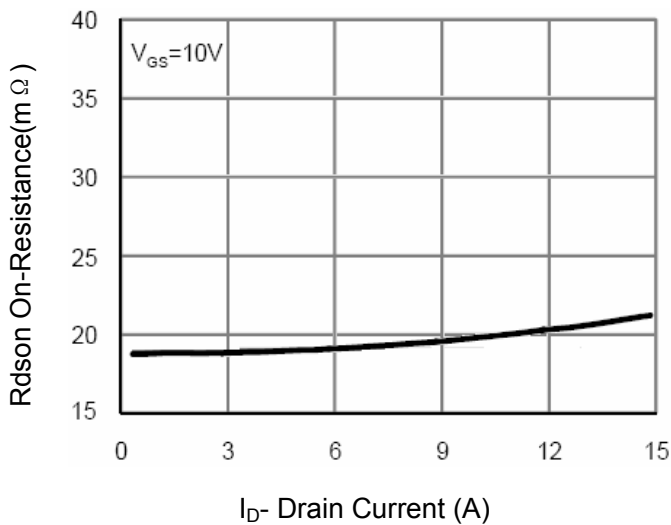
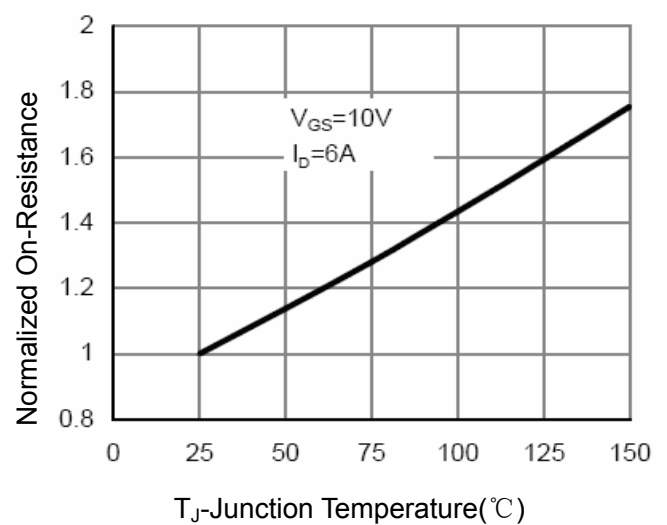
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250μA	30	31	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	-	-	1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	0.7	1.0	1.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =2A	-	23	32	mΩ
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =2A	-	25	38	mΩ
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =3.3V, I <sub>D</sub> =2A	-	26	42	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =6A	15	-	-	S
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, F=1.0MHz	-	255	-	PF
Output Capacitance	C <sub>oss</sub>		-	45	-	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	35	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =15V, R <sub>L</sub> =2.5Ω V <sub>GS</sub> =10V, R <sub>GEN</sub> =3Ω	-	4.5	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	2.5	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	14.5	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	3.5	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =15V, I <sub>D</sub> =6A, V <sub>GS</sub> =10V	-	13	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	5.5	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	3.5	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =6A	-	0.8	1.2	V

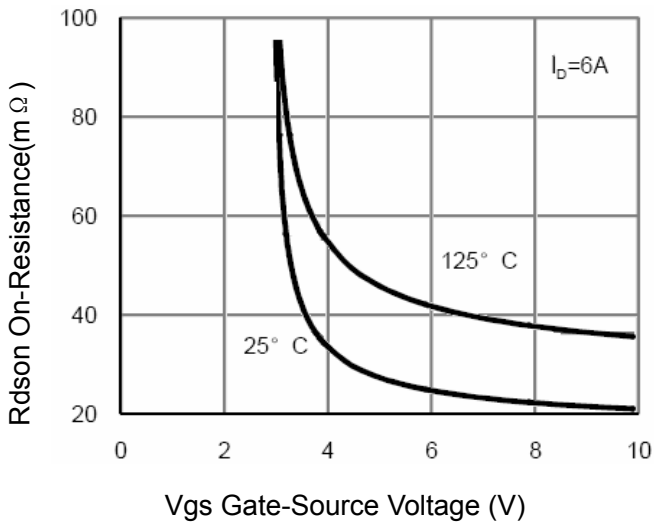
## P-CH Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =-250μA	-30	-33	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-30V, V <sub>GS</sub> =0V	-	-	-1	μA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.0	-1.8	-2.3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-15V, I <sub>D</sub> =-2A	-	34	45	mΩ
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-2A	-	37	50	mΩ
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-2A	-	54	80	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-6.5A	10	-	-	S
<b>Dynamic Characteristics</b> (Note 4)						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, F=1.0MHz	-	520	-	PF
Output Capacitance	C <sub>OSS</sub>		-	100	-	PF
Reverse Transfer Capacitance	C <sub>RSS</sub>		-	65	-	PF
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-15V, R <sub>L</sub> =2.3Ω V <sub>GS</sub> =-10V, R <sub>GEN</sub> =6Ω	-	7.5	-	nS
Turn-on Rise Time	t <sub>r</sub>		-	5.5	-	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		-	19	-	nS
Turn-Off Fall Time	t <sub>f</sub>		-	7	-	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-15V, I <sub>D</sub> =-6.5A V <sub>GS</sub> =-10V	-	9.2	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	1.6	-	nC
Gate-Drain Charge	Q <sub>gd</sub>		-	2.2	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-6.5A	-	-	-1.2	V

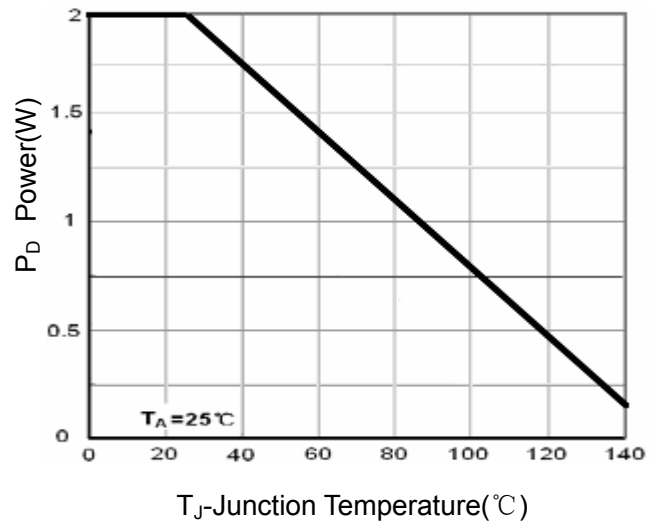
### Notes:

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

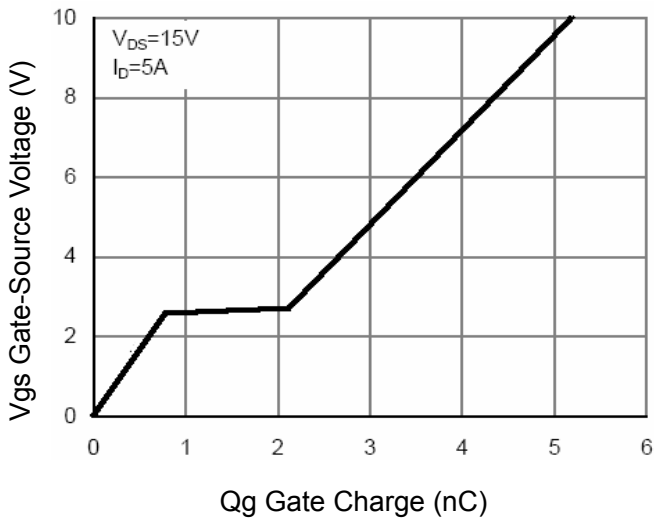
**N- Channel Typical Electrical and Thermal Characteristics (Curves)**

**Figure 1: Switching Test Circuit**

**Figure 2: Switching Waveforms**

**Figure 3 Output Characteristics**

**Figure 4 Transfer Characteristics**

**Figure 5 Drain-Source On-Resistance**

**Figure 6 Drain-Source On-Resistance**



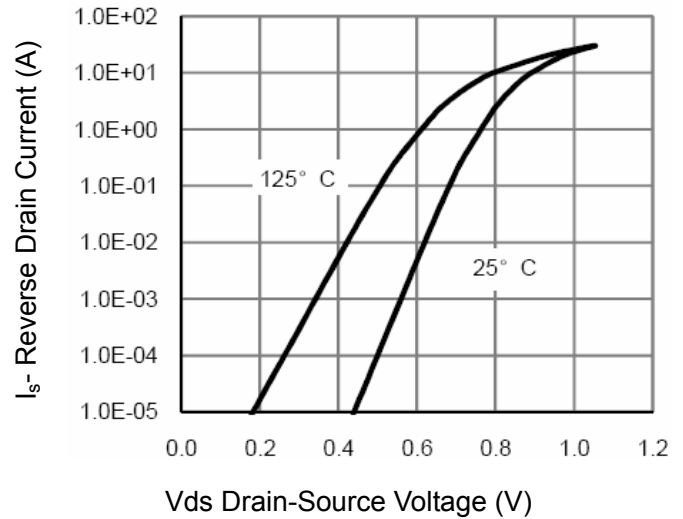
Vgs Gate-Source Voltage (V)  
**Figure 7 Rdson vs Vgs**



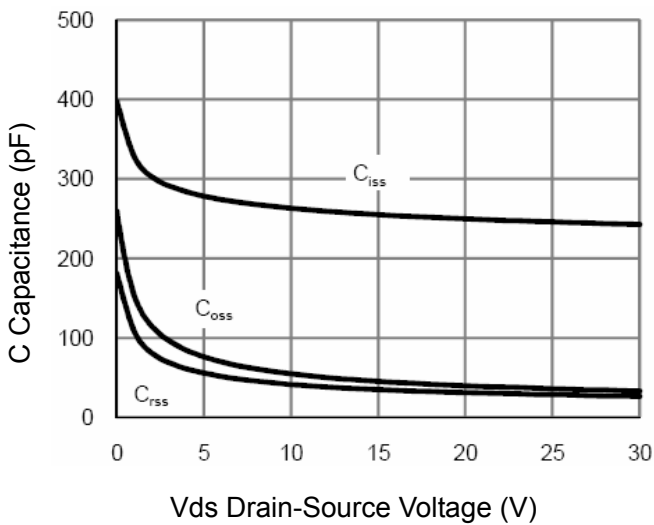
T<sub>J</sub>-Junction Temperature(°C)  
**Figure 8 Power Dissipation**



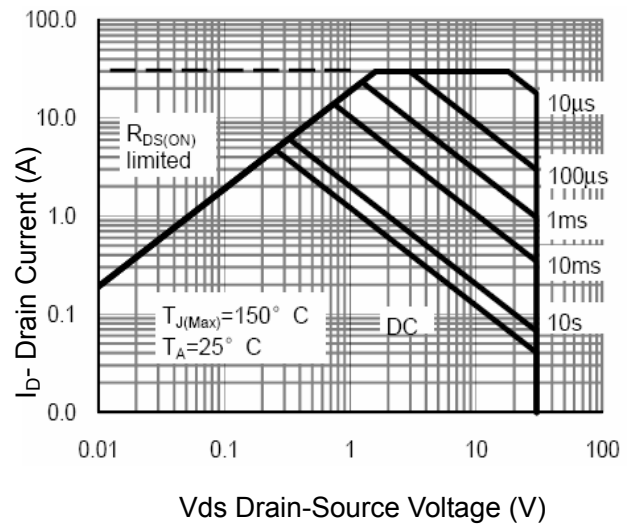
Qg Gate Charge (nC)  
**Figure 9 Gate Charge**



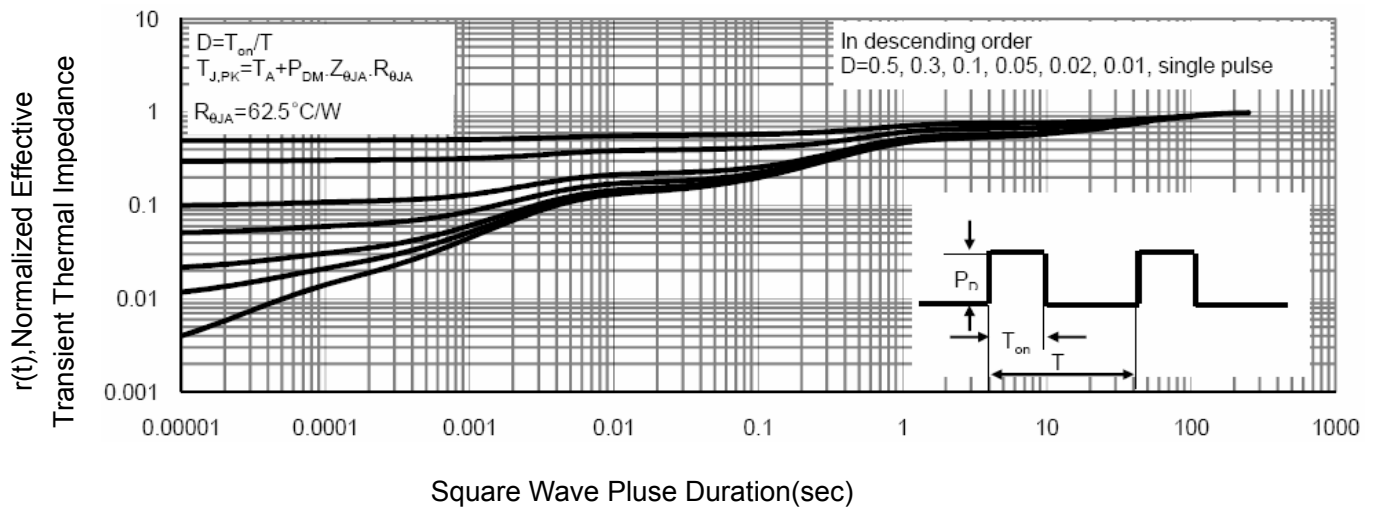
Vds Drain-Source Voltage (V)  
**Figure 10 Source- Drain Diode Forward**



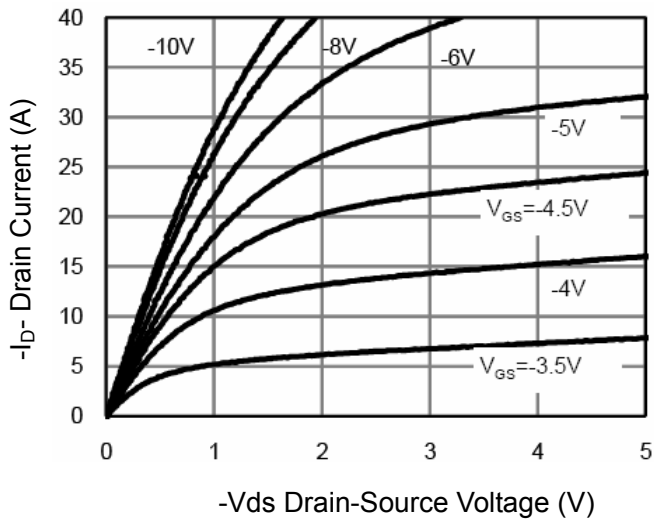
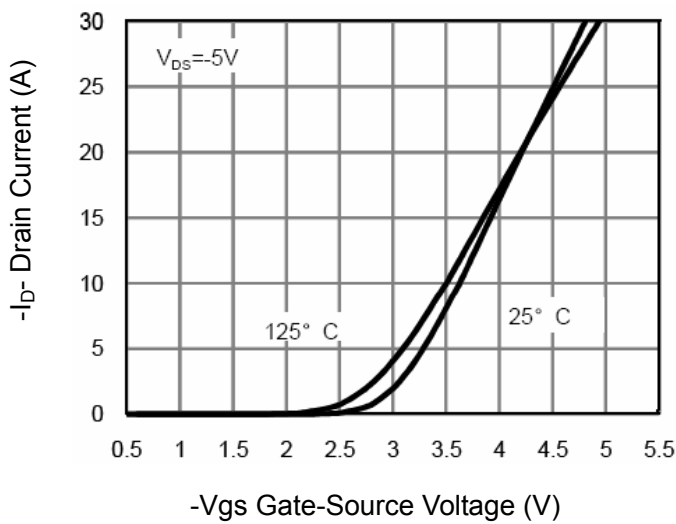
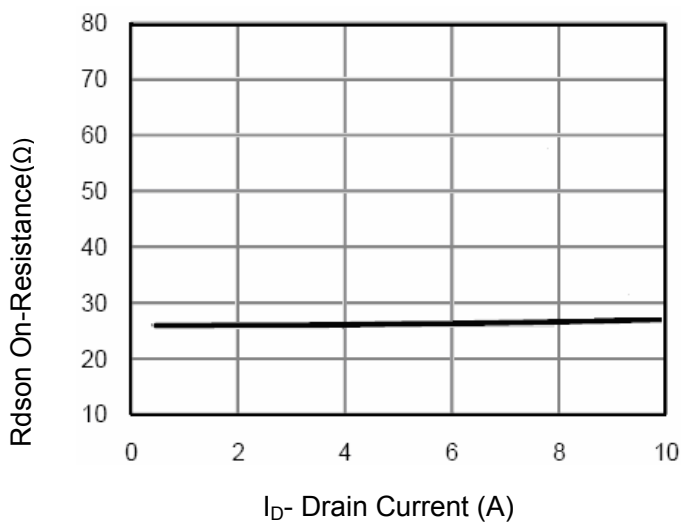
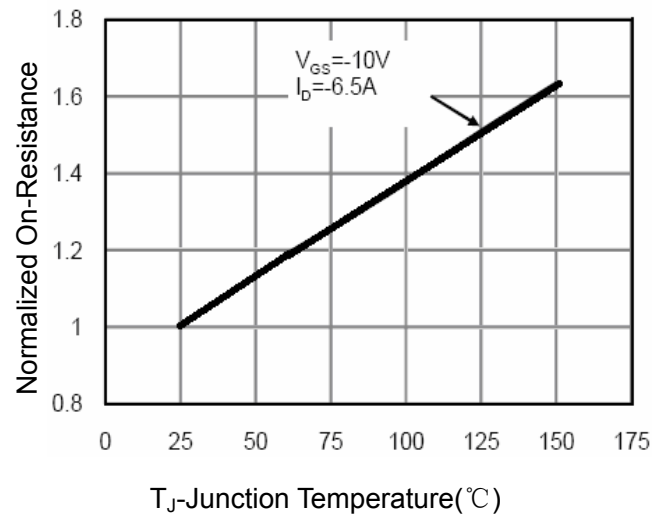
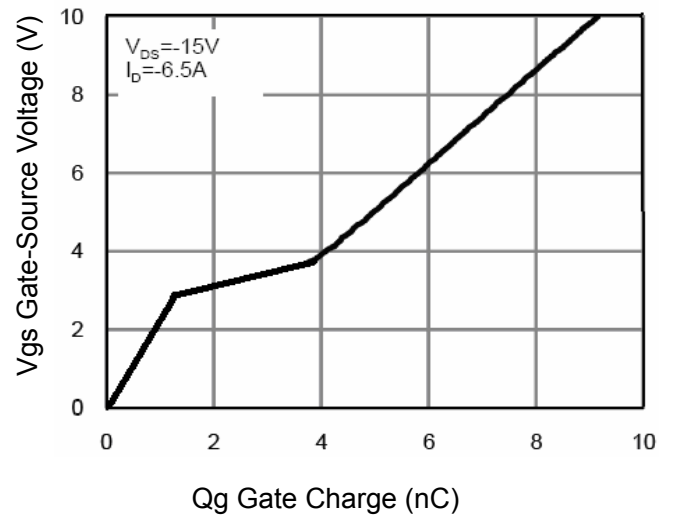
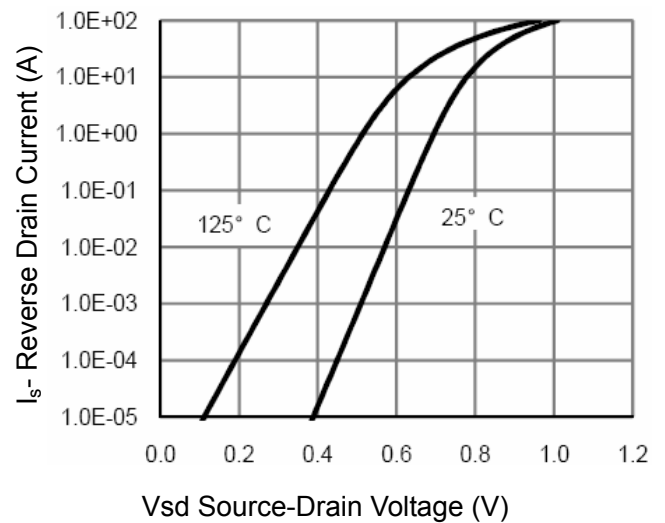
Vds Drain-Source Voltage (V)  
**Figure 11 Capacitance vs Vds**

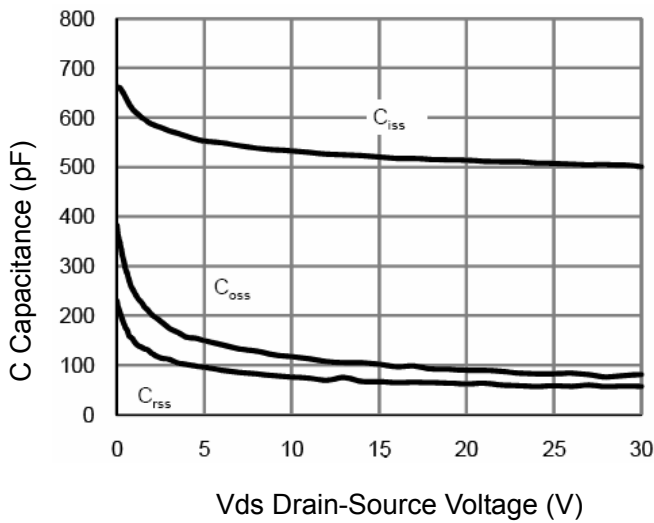
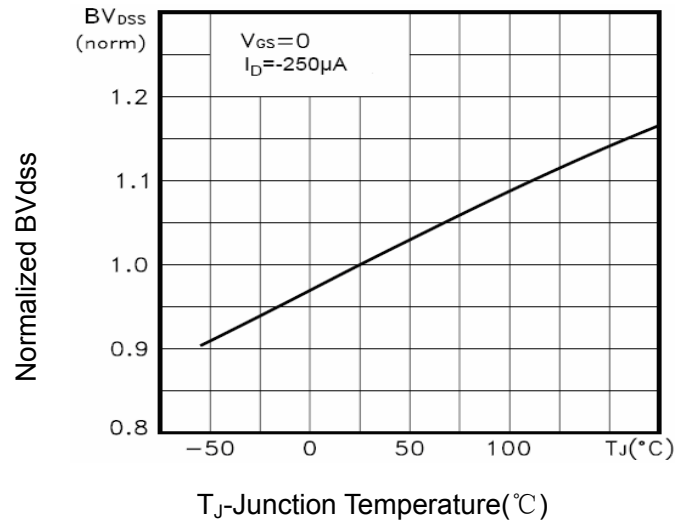
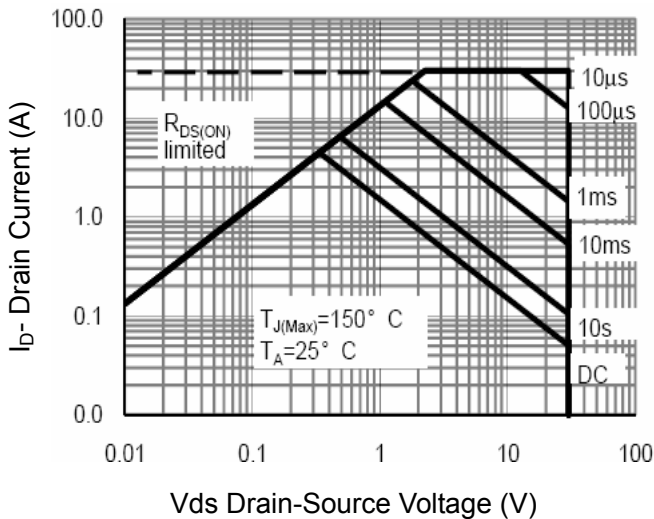
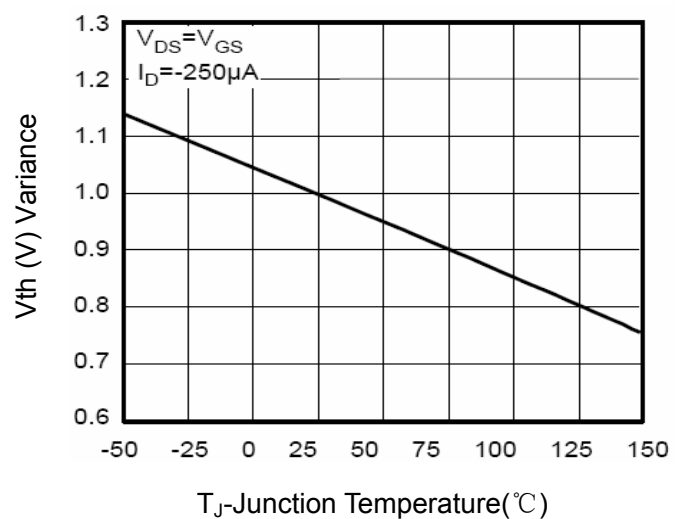
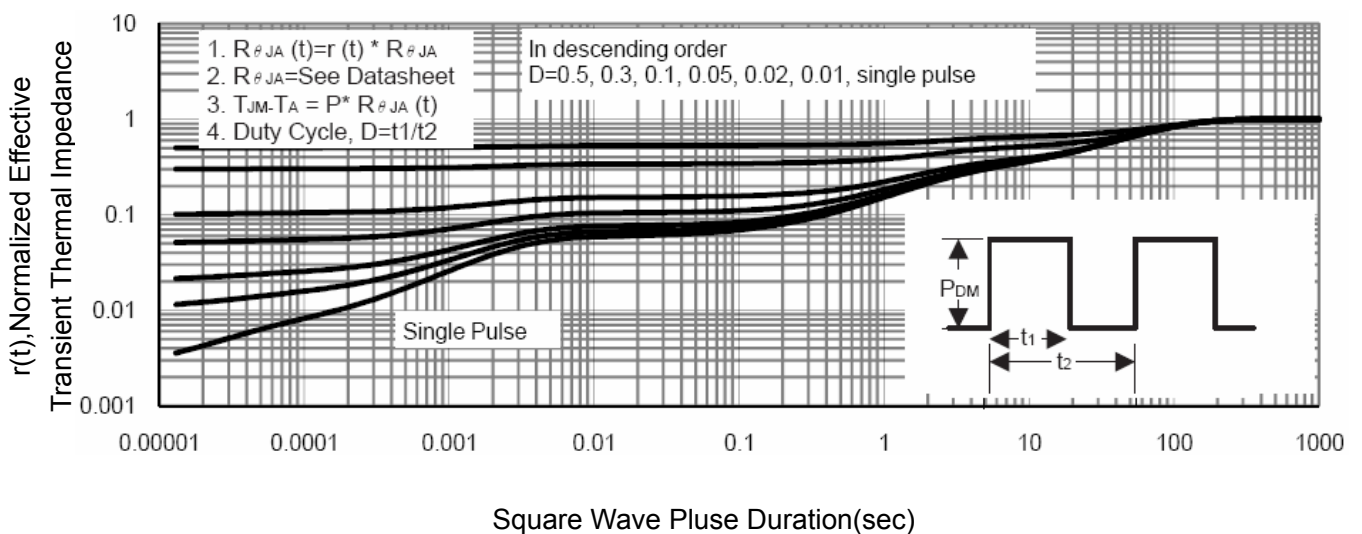


Vds Drain-Source Voltage (V)  
**Figure 12 Safe Operation Area**



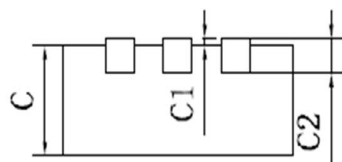
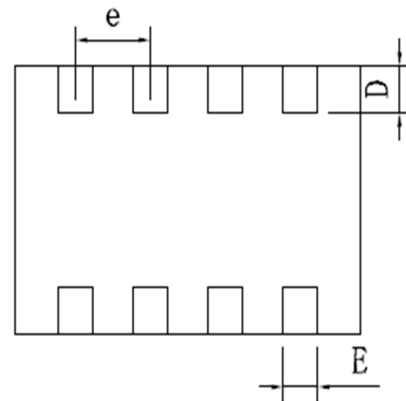
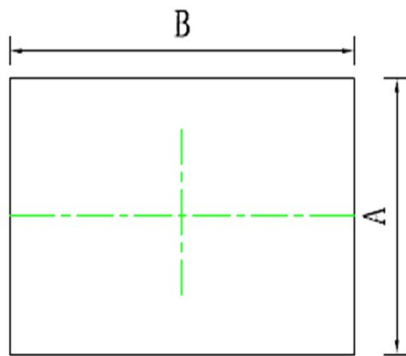
**Figure 13 Normalized Maximum Transient Thermal Impedance**

**P- Channel Typical Electrical and Thermal Characteristics (Curves)**

**Figure 1 Output Characteristics**

**Figure 2 Transfer Characteristics**

**Figure 3 Rdson- Drain Current**

**Figure 4 Rdson-Junction Temperature**

**Figure 5 Gate Charge**

**Figure 6 Source- Drain Diode Forward**


**Figure 7 Capacitance vs Vds**

**Figure 9 BV<sub>DSS</sub> vs Junction Temperature**

**Figure 8 Safe Operation Area**

**Figure 10 V<sub>GS(th)</sub> vs Junction Temperature**

**Figure 11 Normalized Maximum Transient Thermal Impedance**



# DFN2030-8L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.95	2.00	2.05
B	2.95	3.00	3.05
C	0.75	0.80	0.85
C1			0.05
C2	0.18	0.20	0.22
D	0.28	0.35	0.42
E	0.25	0.30	0.35
e	0.65 TYP		

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