■ PRODUCT CHARACTERISTICS

N-Channel	P-Channel
BV_{DSS} = 40V	BV_{DSS} = -40V
$R_{DS(on)}$ (Typ@VGS= 10V) < 17mΩ	$R_{DS(on)}$(Typ@VGS= -10V) < 29mΩ
$R_{DS(on)}$ (Typ@VGS= 4.5V) < 22mΩ	$R_{DS(on)}$(Typ@VGS= -4.5V) < 34mΩ

Symbol

■ APPLICATIONS
- Motor Drive
- DC-DC Converter

N-Channel   P-Channel

■ FEATURES
- Advanced trench cell design
- Super trench
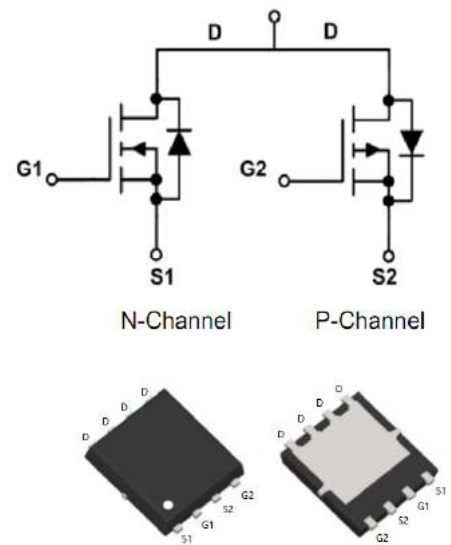- Low thermal resistance

■ Absolute Maximum Ratings (T$_C$=25℃ unless otherwise specified)

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	T$_C$=25℃	I_D	28	-15	A
	T$_C$=100℃		19.8	-10.6	A
Pulsed Drain Current [Note 1]		I_{DM}	70	-60	A
Maximum Power Dissipation	T$_C$=25℃	P_D	35		W
Operating Junction and Storage Temperature Range		T$_J$,T$_{STG}$	-55 To 150		℃

■ THERMAL DATA

Thermal Resistance,Junction-to-Case[Note 2]	$R_{θJC}$	3.6	℃/W

■ N-Channel Electrical Characteristics（T$_C$=25℃ unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV$_{DSS}$	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$_{GS}$=±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	1.4	2.0	V
Drain-Source On-State Resistance	R$_{DS(ON)}$	V$_{GS}$=10V, I$_D$=15A	-	17	22	mΩ
		V$_{GS}$=4.5V, I$_D$=10A	-	22	30	mΩ
Forward Transconductance	g$_{FS}$	V$_{DS}$=5V,I$_D$=15A	-	7	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C$_{Iss}$	V$_{DS}$=20V,V$_{GS}$=0V, F=1.0MHz	-	964	-	PF
Output Capacitance	C$_{oss}$		-	109	-	PF
Reverse Transfer Capacitance	C$_{rss}$		-	96	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t$_{d(on)}$	V$_{DD}$=20V ,R$_L$=2.5Ω V$_{GS}$=10V,R$_G$=3Ω	-	5.5	-	nS
Turn-on Rise Time	t$_r$		-	14	-	nS
Turn-Off Delay Time	t$_{d(off)}$		-	24	-	nS
Turn-Off Fall Time	t$_f$		-	5	-	nS
Total Gate Charge	Q$_g$	V$_{DS}$=20V,I$_D$=15A, V$_{GS}$=10V	-	22.9	-	nC
Gate-Source Charge	Q$_{gs}$		-	3.5	-	nC
Gate-Drain Charge	Q$_{gd}$		-	5.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V$_{SD}$	V$_{GS}$=0V,I$_S$=15A	-	-	1.2	V
Diode Forward Current (Note 2)	I$_S$		-	-	28	A

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

5. EAS condition:Tj=25℃,VDD=20V,VG=10V,L=0.5mH,Rg=25Ω

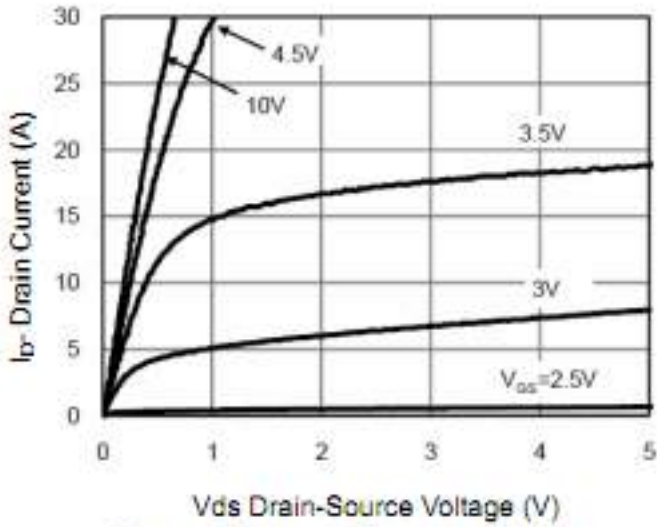■ N-CHANNEL TEST CIRCUITS AND WAVEFORMS

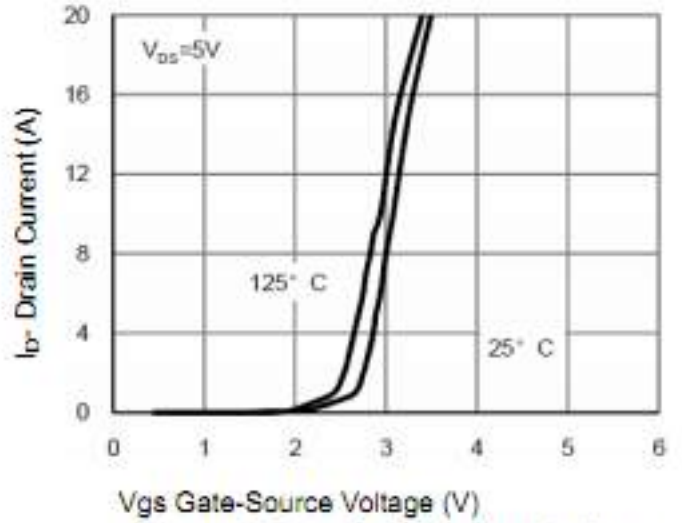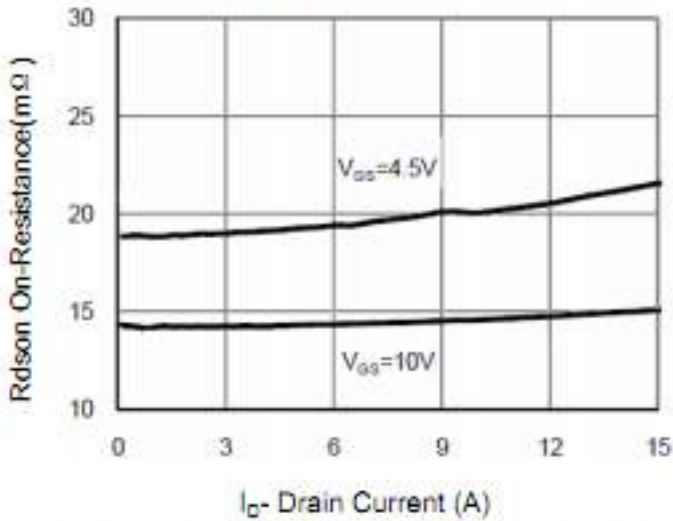Figure 1 Output Characteristics

Figure 2 Transfer Characteristics
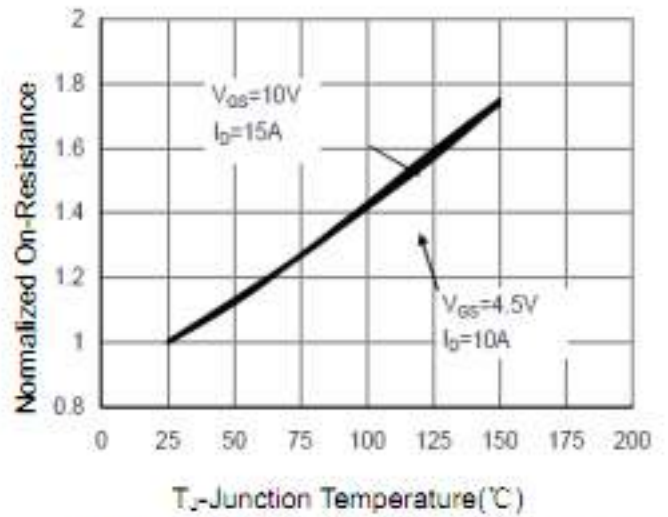
Figure 3 Drain-Source On-Resistance
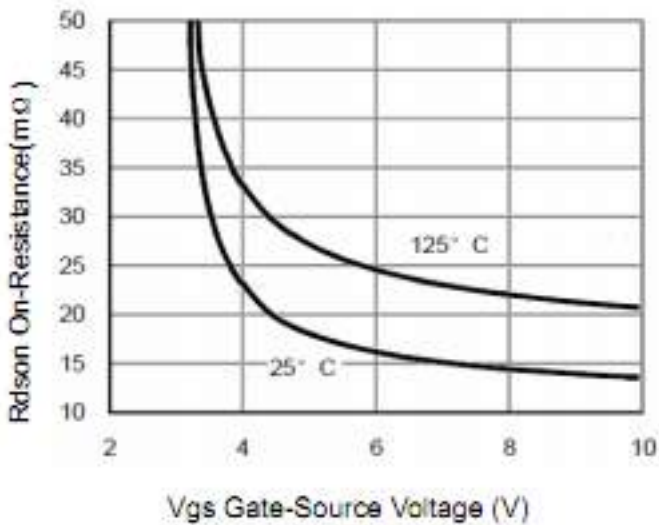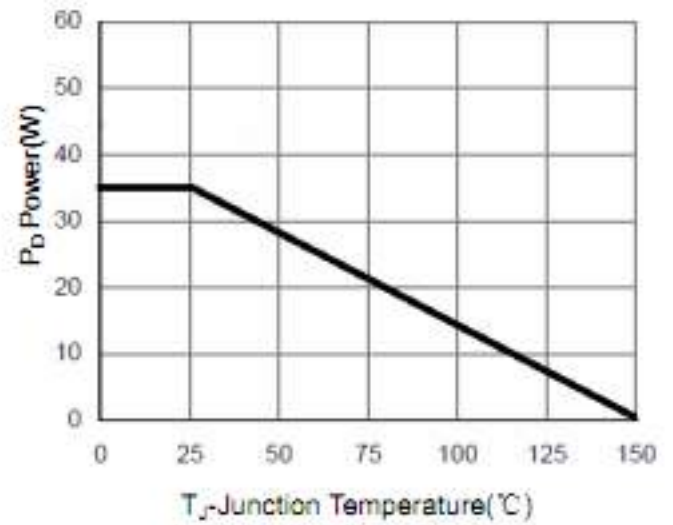
Figure 4 Drain-Source On-Resistance

Figure 5 Rdson vs Vgs

Figure 6 Power Dissipation
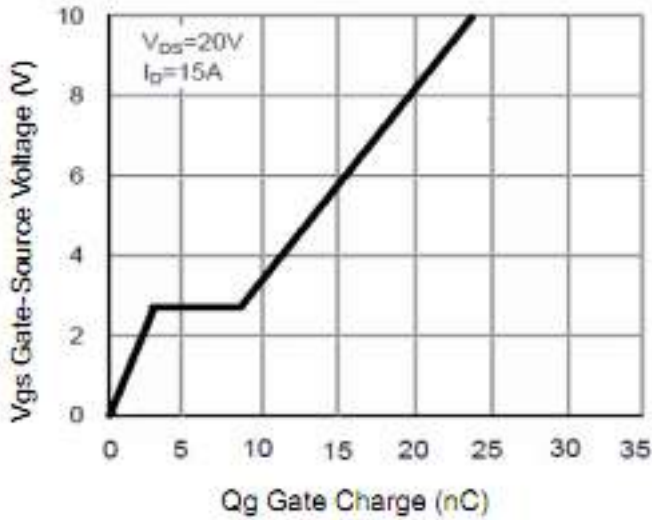
■ N-CHANNEL TEST CIRCUITS AND WAVEFORMS(Cont.)

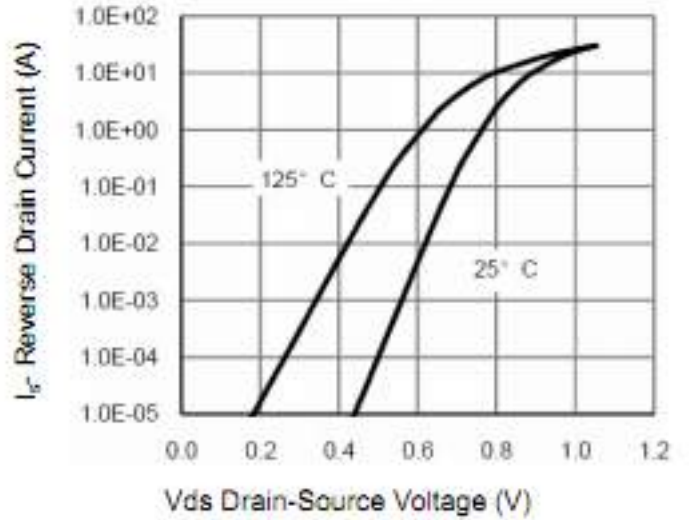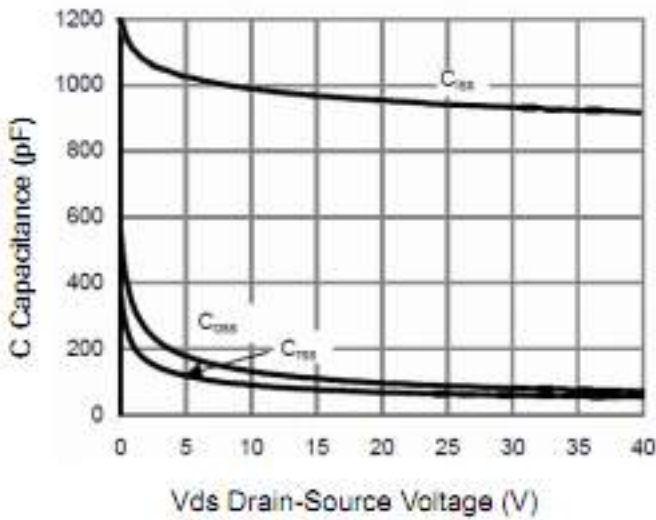**Figure 7 Gate Charge**

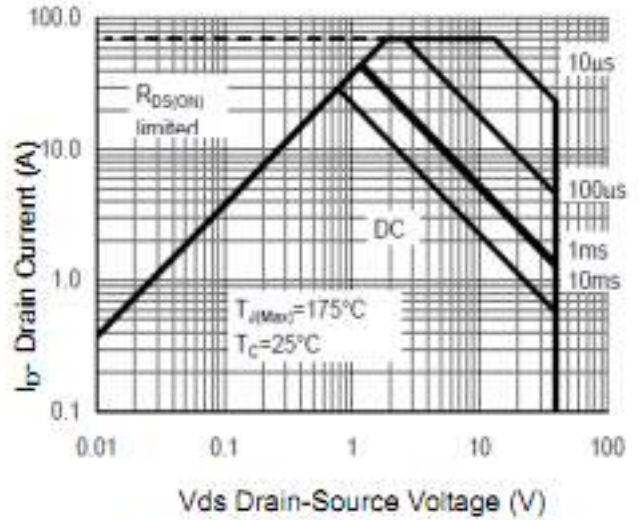**Figure 8 Source- Drain Diode Forward**

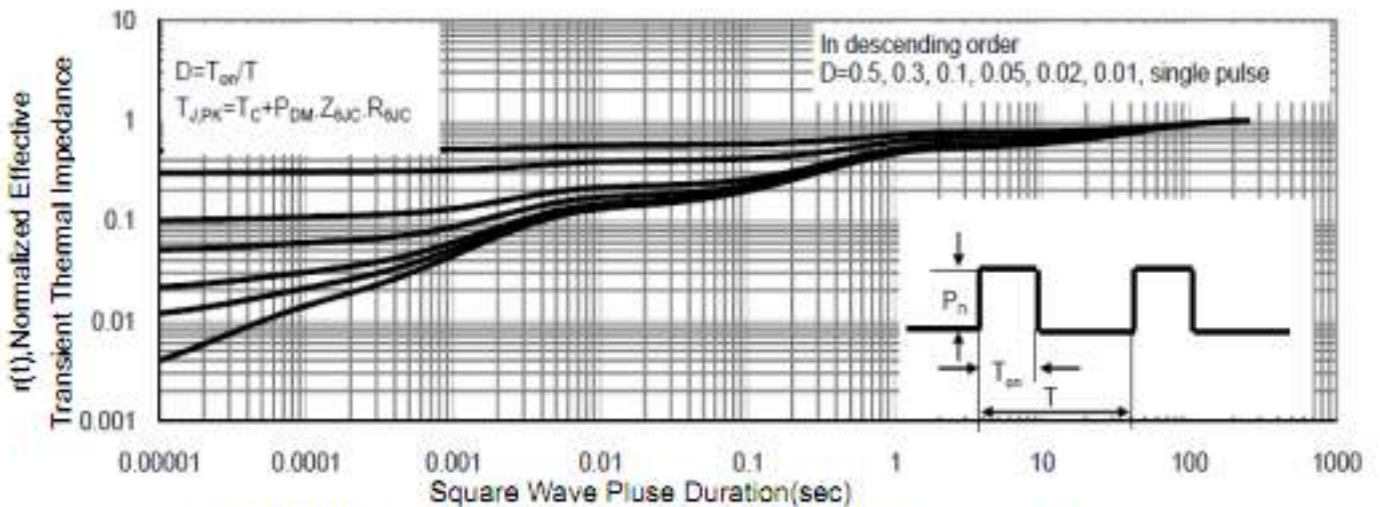**Figure 9 Capacitance vs Vds**

Figure 10 Safe Operation Area

Figure 11 Normalized Maximum Transient Thermal Impedance

■ P-Channel Electrical Characteristics (T$_C$=25℃ unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV$_{DSS}$	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$_{GS}$=±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	-2.0	V
Drain-Source On-State Resistance	R$_{DS(ON)}$	V$_{GS}$=-10V, I$_D$=-7A	-	29	35	mΩ
		V$_{GS}$=-4.5V, I$_D$=-4A	-	34	45	mΩ
Forward Transconductance	g$_{FS}$	V$_{DS}$=-5V,I$_D$=-7A	20	-	-	S
Dynamic Characteristics$^{(Note4)}$						
Input Capacitance	C$_{Iss}$	V$_{DS}$=-20V,V$_{GS}$=0V, F=1.0MHz	-	964	-	PF
Output Capacitance	C$_{oss}$		-	109	-	PF
Reverse Transfer Capacitance	C$_{rss}$		-	96	-	PF
Switching Characteristics$^{(Note 4)}$						
Turn-on Delay Time	t$_{d(on)}$	V$_{DD}$=-20V, R$_L$=2.3Ω V$_{GS}$=-10V,R$_{GEN}$=6Ω	-	5.5	-	nS
Turn-on Rise Time	t$_r$		-	14	-	nS
Turn-Off Delay Time	t$_{d(off)}$		-	24	-	nS
Turn-Off Fall Time	t$_f$		-	12	-	nS
Total Gate Charge	Q$_g$	V$_{DS}$=-20V,I$_D$=-7A V$_{GS}$=-10V	-	22.9	-	nC
Gate-Source Charge	Q$_{gs}$		-	3.5	-	nC
Gate-Drain Charge	Q$_{gd}$		-	5.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage $^{(Note 3)}$	V$_{SD}$	V$_{GS}$=0V,I$_S$=-10A	-	-	1.2	V

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■ P-CHANNEL TEST CIRCUITS AND WAVEFORMS

Figure 1 Output Characteristics

Figure 2 Transfer Characteristics

Figure 3 Rdson- Drain Current

Figure 4 Rdson-Junction Temperature

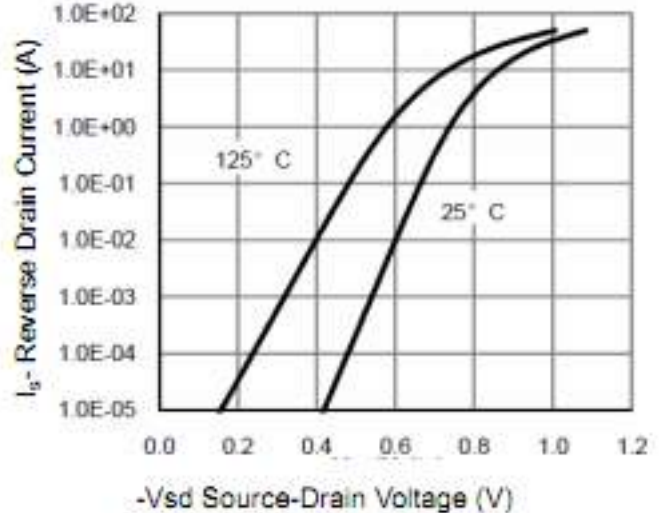**Figure 5 Gate Charge**

Figure 6 Source- Drain Diode Forward

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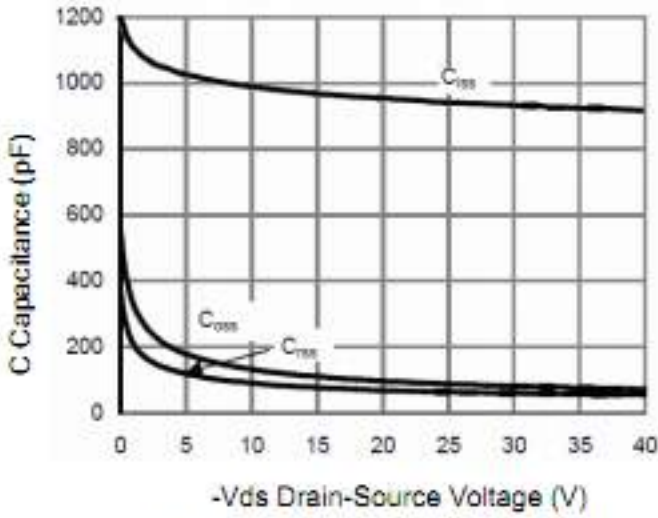■ P-CHANNEL TEST CIRCUITS AND WAVEFORMS(Cont.)
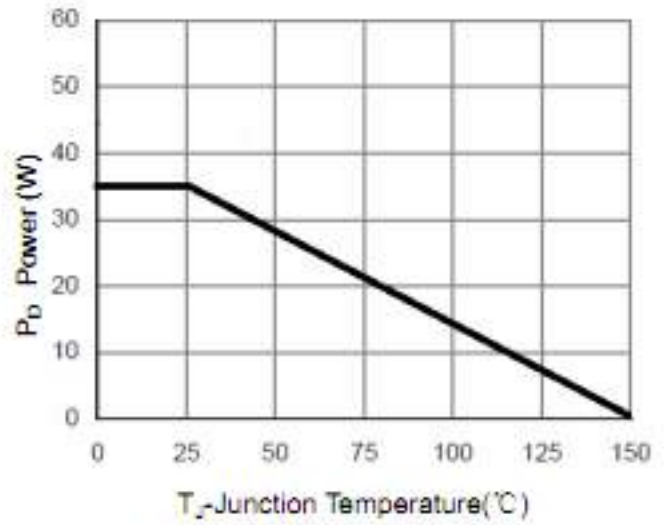
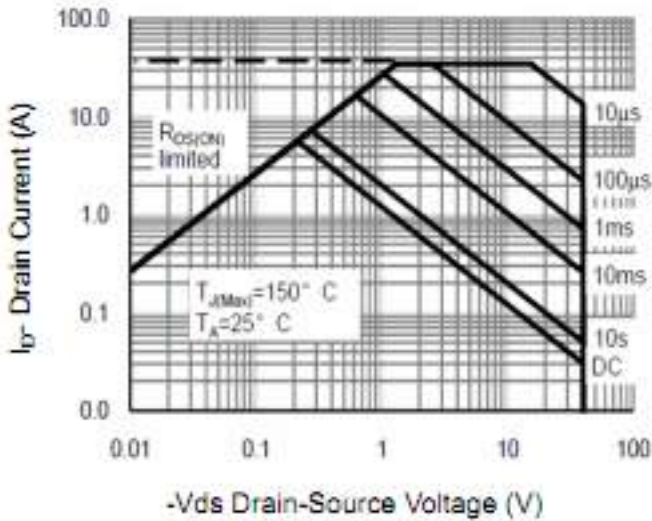**Figure 7 Capacitance vs Vds**

Figure 9 Power Dissipation
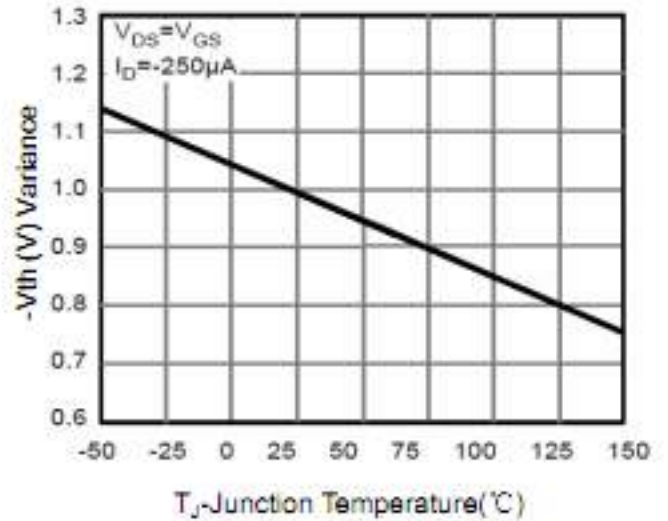
Figure 8 Safe Operation Area

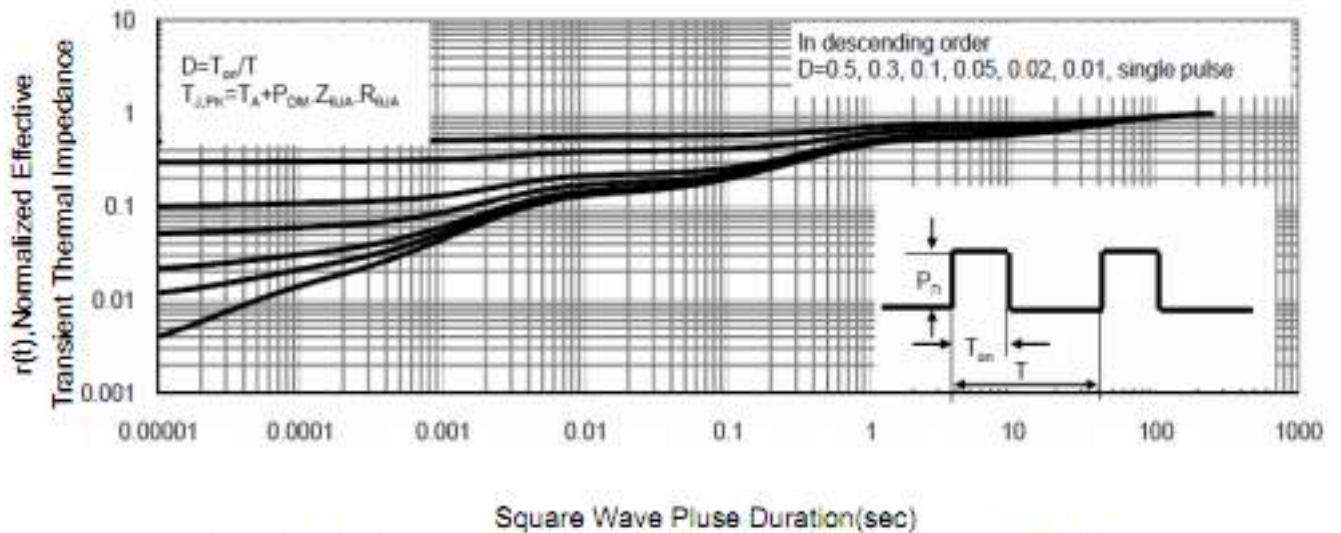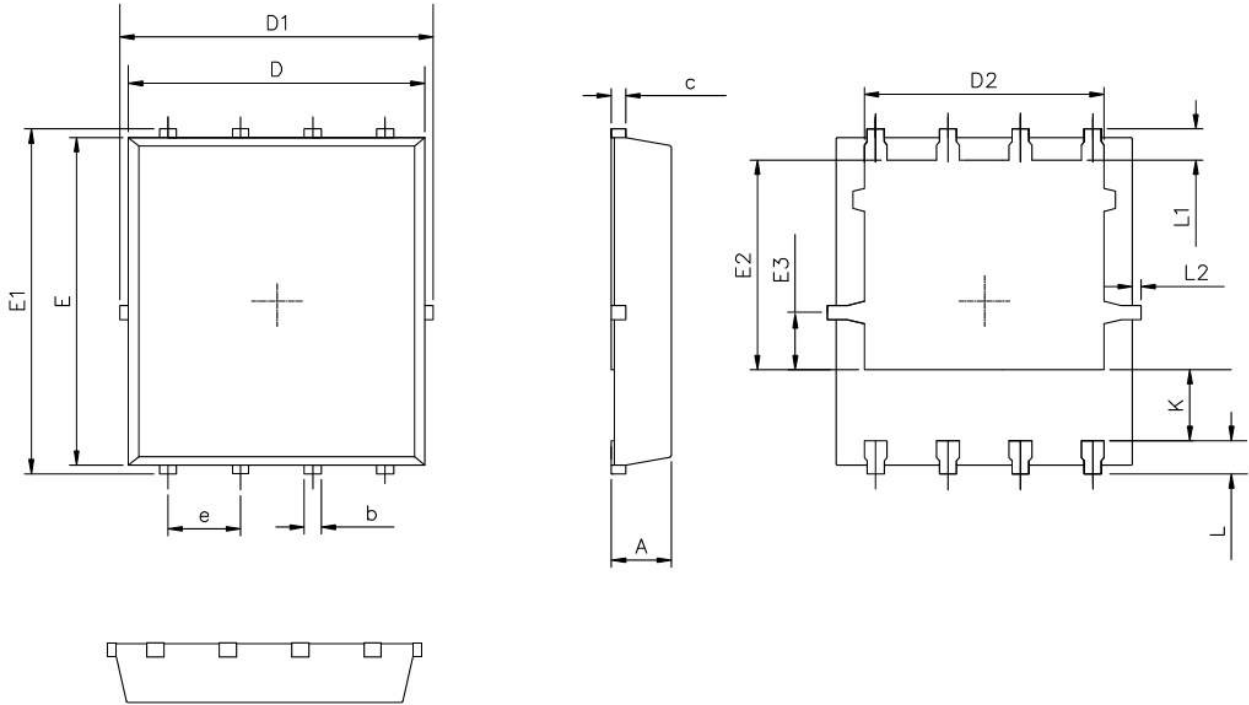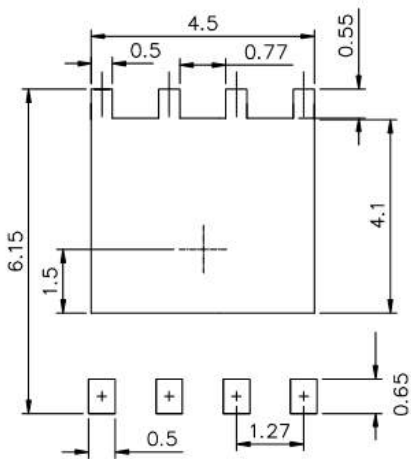**Figure 10 V$_{GS(th)}$ vs Junction Temperature**

Figure 11 Normalized Maximum Transient Thermal Impedance

■ PDFN5060-8L Package Mechanical Data

RECOMMENDED LAND PATTERN

UNIT:mm

	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.25	0.35	0.50
c	0.10	0.20	0.30
D	4.80	5.00	5.30
D1	4.90	5.10	5.50
D2	3.92	4.02	4.20
E	5.65	5.75	5.85
E1	5.90	6.05	6.20
E2	3.325	3.525	3.775
E3	0.80	0.90	1.00
e		1.27	
L	0.40	0.55	0.70
L1		0.65	
L2	0.00		0.15
K	1.00	1.30	1.50

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