Features

- Super Low Gate Charge
- Green Device Available
- Excellent Cdv/dt effect decline
- Advanced high cell density Trench technology
- 100% EAS Guaranteed

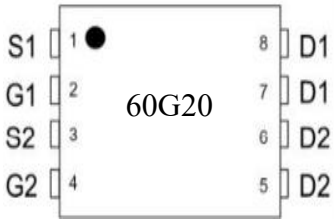
Bvdss	Rdson	ID
60V	25mΩ	20A
-60V	42mΩ	-20A

Application

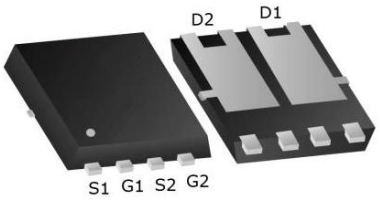
RoHS

- Power management in half bridge and inverters
- Load Switch
- DC-DC Converter

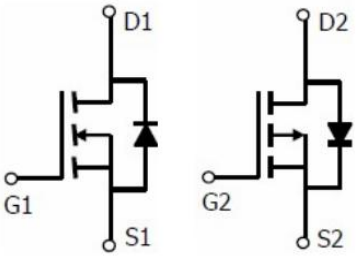
Package



Marking and pin assignment



PDFN5*6-8L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
60G20	60G20F	PDFN5*6-8L	5000

Absolute Maximum Ratings

Parameter	Symbol	Value		Unit
		N-Channel	P-Channel	
Drain-Source Voltage	V_{DS}	60	-60	V
Gate-Source Voltage	V_{GS}	±30	±20	V
Continuous Drain Current	I_D@T_C =25℃	20	-20	A
	I_D@T_C =100℃	13	-13	A
Pulsed Drain Current[note1]	I_{DM}	100	-100	A
Single Pulsed Avalanche Energy[note2]	E_{As}	39	90	mJ
Total Power Dissipation	P_D@T_A =25℃	41.7	89	W
Junction Temperature Range	T_J	-55~+150		℃
Storage Temperature Range	T_{STG}	-55~+150		℃

Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	--	℃/W
Thermal Resistance Junction-Ambient[1]	$R_{\theta JA}$	50/47	℃/W

Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	D	S	
HL60G20F	PDFN5*6-8L	2,4	5,6,7,8	1,3	Tape Reel

N-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V , I_D=-250uA	60	-	-	V
Static Drain-Source On-Resistance[4]	$R_{DS(ON)}$	V_{GS}=10V , I_D=10A	-	25	31	mΩ
		V_{GS}=-4.5V , I_D=5A	-	31	40	
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =250uA	1.2	1.7	2.5	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=60V ,V_{GS}=0V , T_J=25℃	-	-	1	uA
		V_{DS}=60V ,V_{GS}=0V , T_J=100℃	-	-	100	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	-	-	±100	nA
Forward Transconductance[4]	gfs	V_{DS}=5V , I_D=10A	-	15.5	-	S
Gate Resistance	R_g	f=1MHz	-	1.2	-	Ω
Total Gate Charge	Q_g	V_{GS}=10V ,V_{DD}=30V , I_D=10A	-	22	-	nC
Gate-Source Charge	Q_{gs}		-	4.2	-	
Gate-Drain Charge	Q_{gd}		-	6.9	-	
Turn-On Delay Time	$T_{d(on)}$	V_{GS}=10V ,V_{DD}=30V , R_G=3Ω , I_D=10A	-	6.4	-	ns
Rise Time	T_r		-	15.3	-	
Turn-Off Delay Time	$T_{d(off)}$		-	25	-	
Fall Time	T_f		-	7.6	-	
Input Capacitance	C_{iss}	V_{DS}=30V , V_{GS}=0V , f=1MHz	-	1355	-	pF
Output Capacitance	C_{oss}		-	60	-	
Reverse Transfer Capacitance	C_{rss}		-	49	-	
Body Diode Reverse Recovery Time	t_{rr}	I_F=-10A, dI_F/dt=100A/μs	-	26	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	45	-	nC
Diode Forward Voltage[4]	V_{SD}	I_S=10A,V_{GS}=0V	-	-	1.2	V
Continuous Source Current@T_C=25℃	I_S	-	-	-	20	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C
2. The EAS data shows Max.rating.The test condition is V_{DD}=25V, V_{GS}=10V, L=0.4mH, I_{AS}=14A
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

P-Channel Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V , I_D=-250uA	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-60V ,V_{GS}=0V, T_J=25℃	-	-	1	uA
		V_{DS}=-60V ,V_{GS}=0V, T_J=100℃	-	-	100	
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V , V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS} , I_D =250uA	-1.2	-1.7	-2.5	V
Drain-Source On-State Resistance[4]	$R_{DS(ON)}$	V_{GS}=-10V , I_D=-20A	-	42	52	mΩ
		V_{GS}=-4.5V , I_D=-10A	-	55	68	
Forward Transconductance[4]	gfs	V_{DS}=5V , I_D=10A	-	-	-	S
Input Capacitance	C_{iss}	V_{DS} = -30V, V_{GS} =0V, f =1MHz	-	862	-	pF
Output Capacitance	C_{oss}		-	163	-	
Reverse Transfer Capacitance	C_{rss}		-	8	-	
Gate Resistance	R_G	f =1MHz	-	13	-	Ω
Total Gate Charge	Q_g	V_{GS} =-10V, V_{DD} =-30V, I_D= -10A	-	13.4	-	nC
Gate-Source Charge	Q_{gs}		-	3.35	-	
Gate-Drain Charge	Q_{gd}		-	1.82	-	
Turn-On Delay Time	$T_{d(on)}$	V_{GS} =-10V, V_{DD} = -30V, R_G = 5Ω, I_D= -10A	-	10	-	ns
Rise Time	T_r		-	6	-	
Turn-Off Delay Time	$T_{d(off)}$		-	23	-	
Fall Time	T_f		-	11	-	
Body Diode Reverse Recovery Time	t_{rr}	I_F=-10A, dI_F/dt=100A/μs	-	18	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	27	-	nC
Diode Forward Voltage[4]	V_{SD}	I_S = 10A, V_{GS} = 0V	-	-	-1.2	V
Continuous Source Current@25℃	I_s	-	-	-	-20	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C
2. The EAS data shows Max. rating . The test condition is V_{DD}=-25V, V_{GS}=-10V, L=0.4mH, I_{AS}=-14A
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

N-Channel Typical Characteristics

Fig.1 Typical Output Characteristics

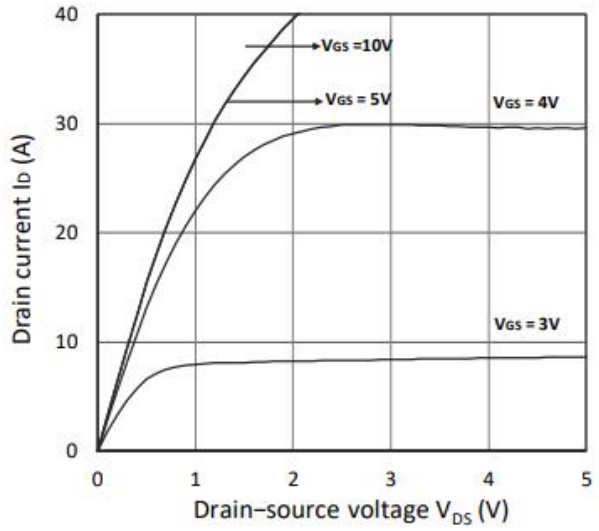


Fig.2 Transfer Characteristics

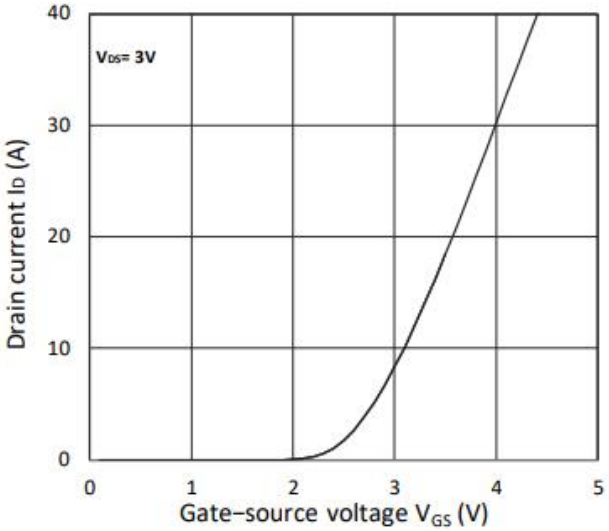


Fig.3 Forward Characteristics Of Reverse

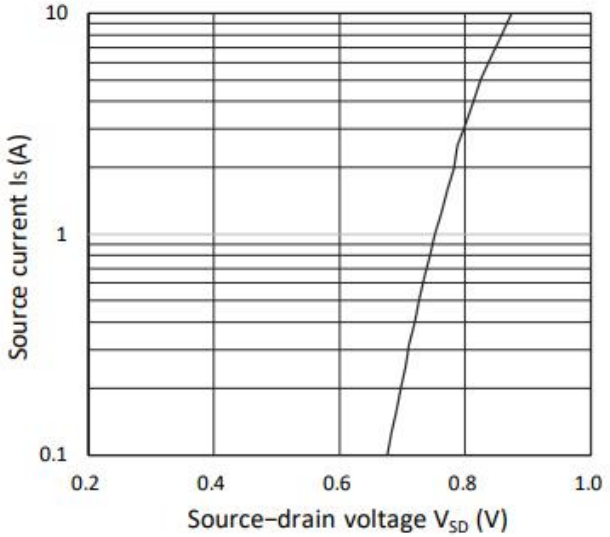


Fig.4 $R_{DS(ON)}$ vs. V_{GS}

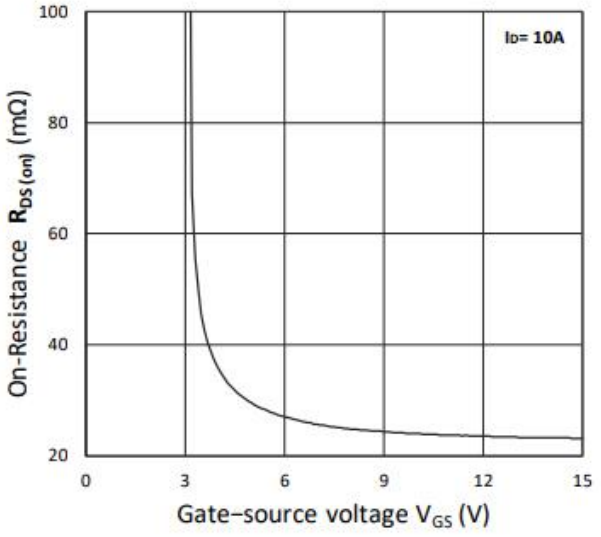


Fig.5 $R_{DS(ON)}$ vs. I_D

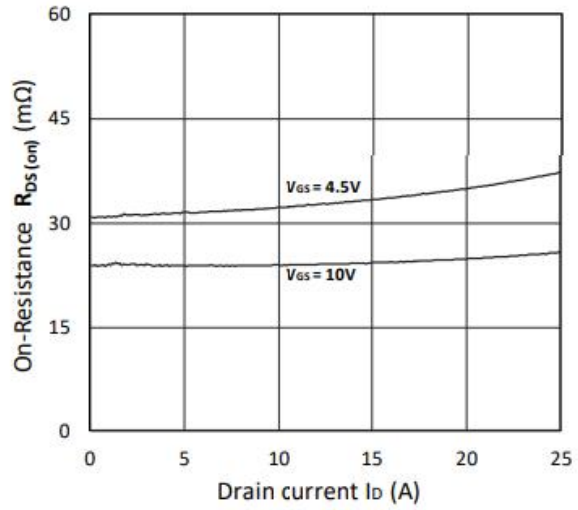


Fig.6 Normalized $R_{DS(on)}$ vs. Temperature

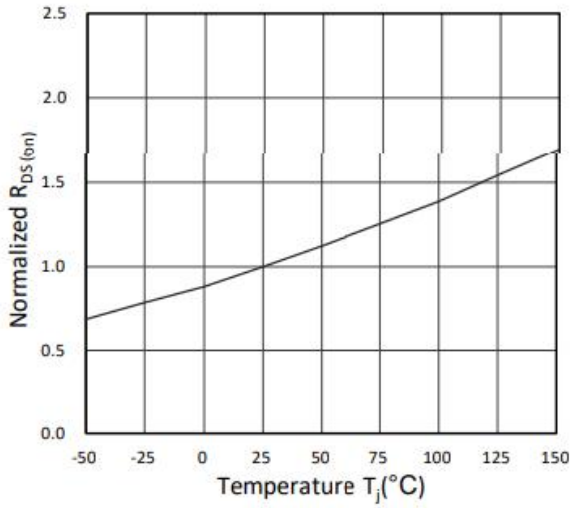


Fig.7 Capacitance Characteristics

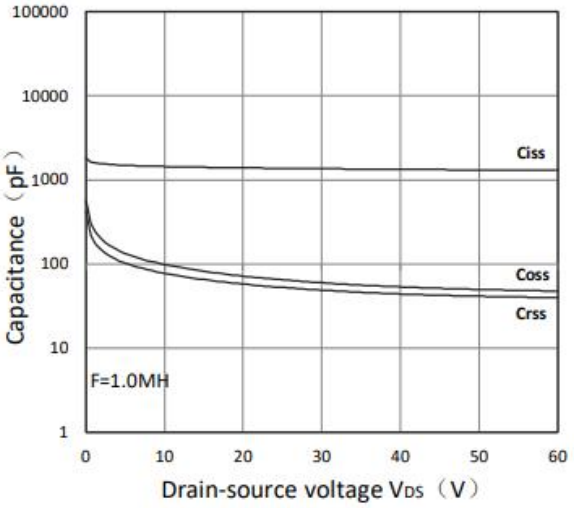


Fig.8 Gate Charge Characteristics

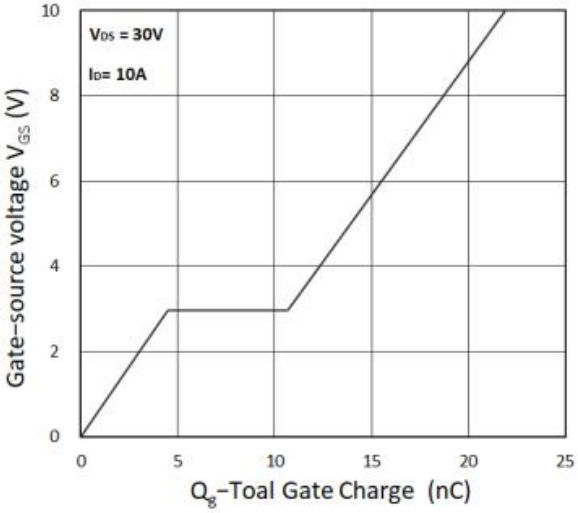


Fig.9 Power Dissipation

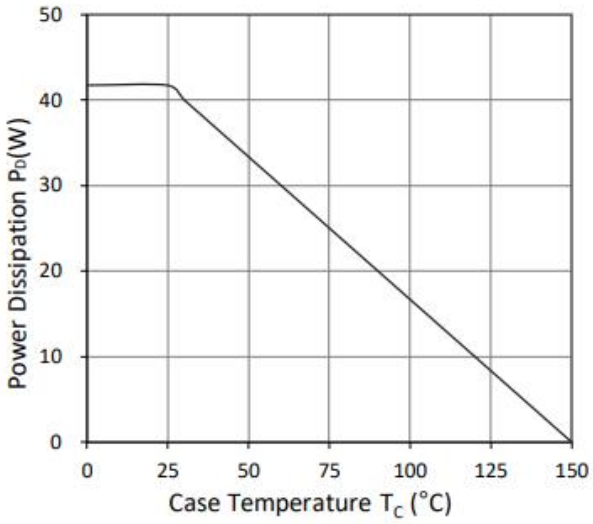


Fig.10 Safe Operating Area

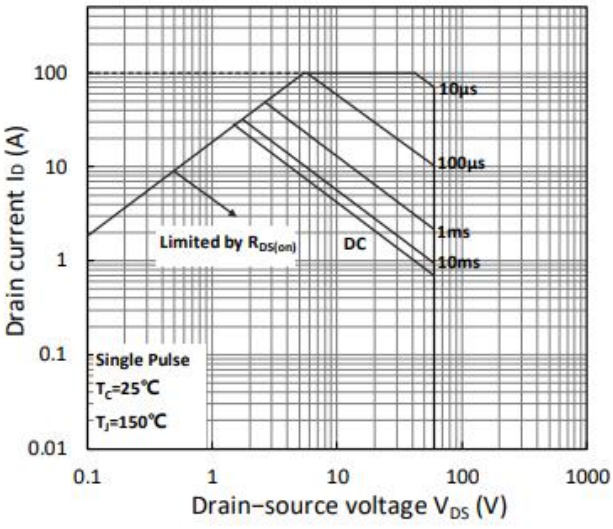
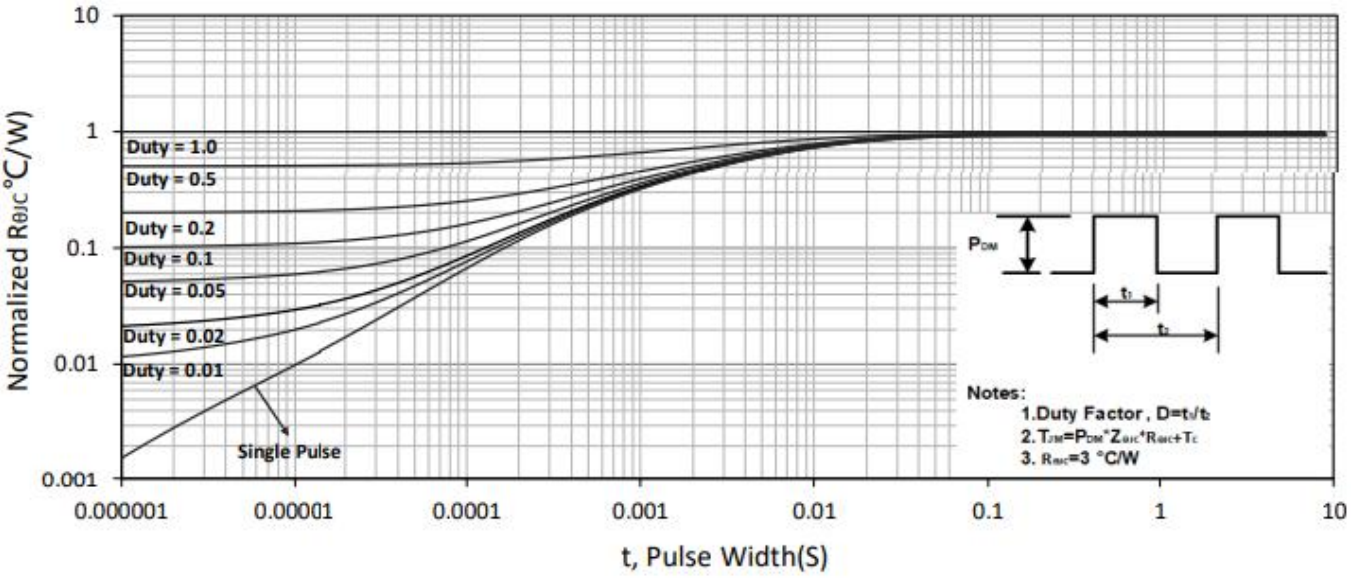


Fig.11 Normalized Maximum Transient Thermal Impedance



P-Channel Typical Characteristics

Fig.1 Typ. output characteristics

$-I_D=f(-V_{DS})$

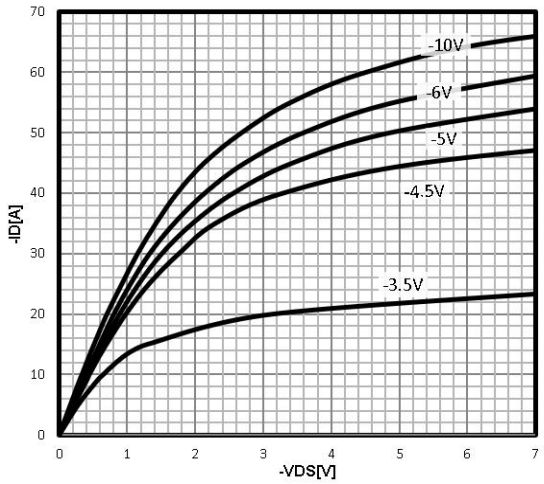


Fig.2 Typ. drain-source on resistance

$R_{DS}(on)=f(-I_D)$

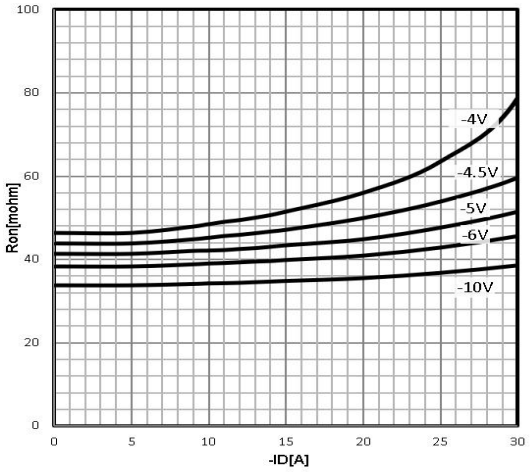


Fig.3 Typ. transfer characteristics

$-I_D=f(-V_{GS})$

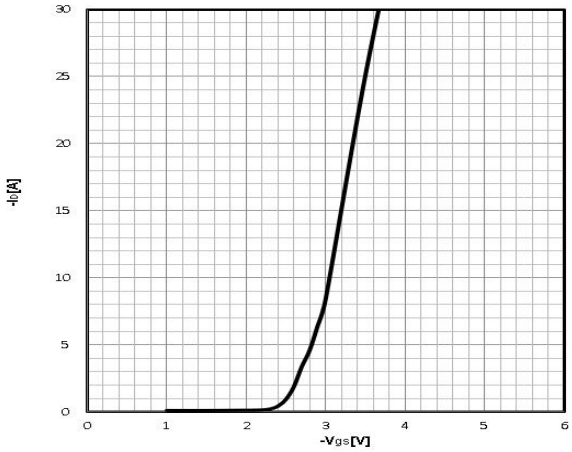


Fig.4 Drain-source on-state resistance

$R_{DS}(on)= f(T_j)$; $I_D=-20A$; $V_{GS}=-10V$

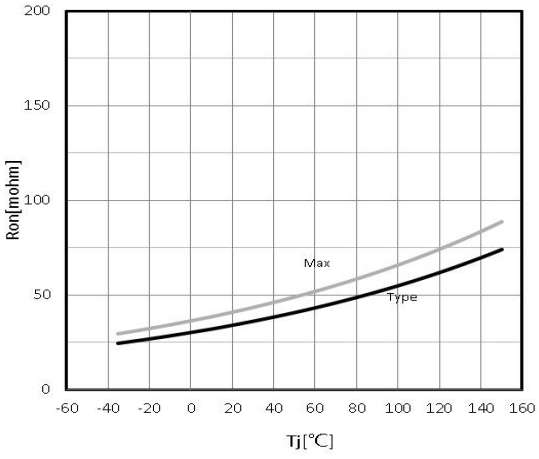


Fig.5 Gate Threshold Voltage

$-V_{TH}=f(T_j)$; I_D=-250uA

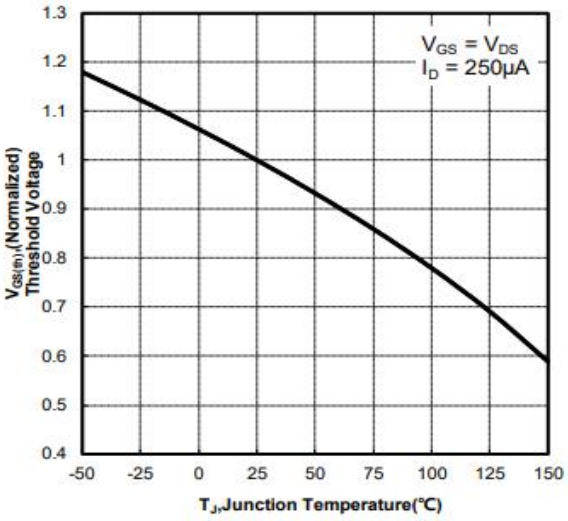


Fig.6 Drain-source breakdown voltage

$-V_{BR(DSS)}=f(T_j)$; ID=-250uA

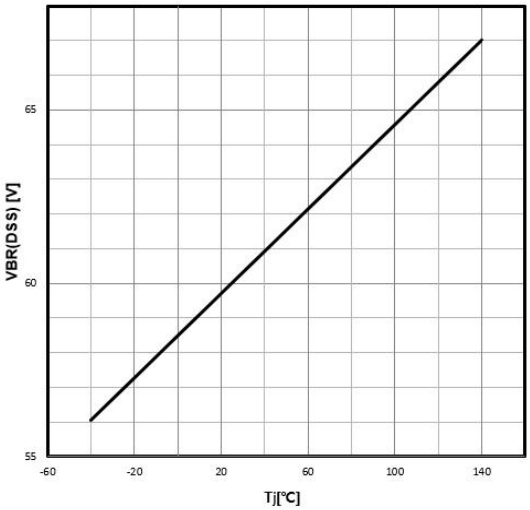


Fig.7 Typ. gate charge

$-V_{GS}=f(Q_g)$; I_D=-20A

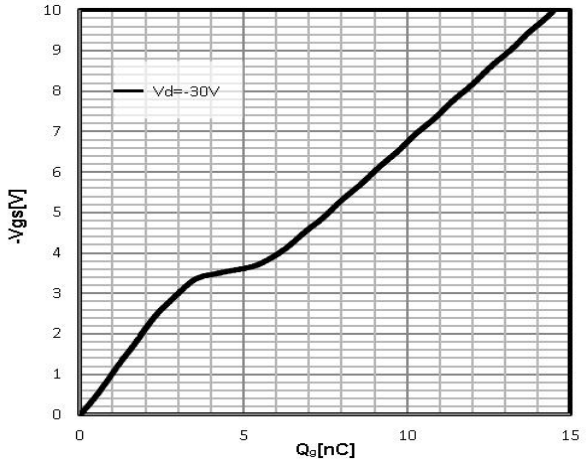


Fig.8 Typ. capacitances

C =f($-V_{DS}$); V_{GS}=0V; f =1MHz

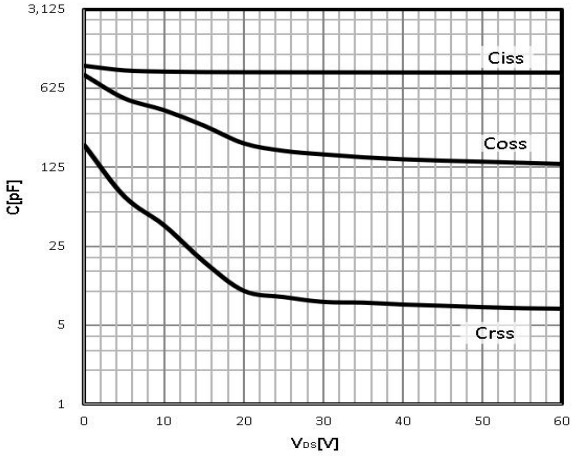


Fig.9Power Dissipation

$P_{tot}=f(T_C)$

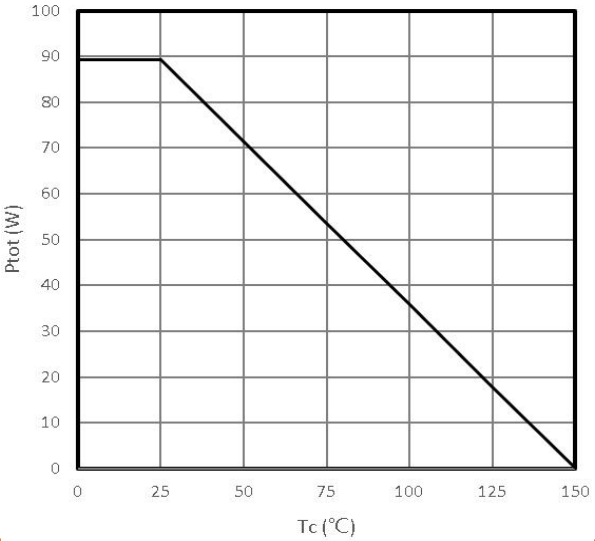


Fig.10 Maximum Drain Current

$-I_D=f(T_C)$

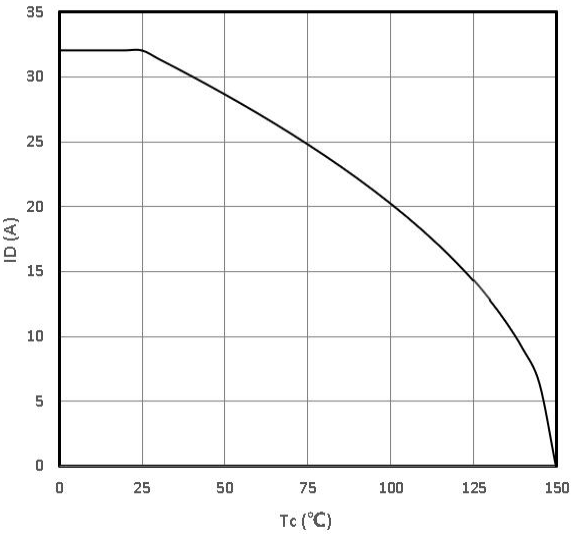


Fig.11 Safe operating area

$-I_D=f(-V_{DS})$

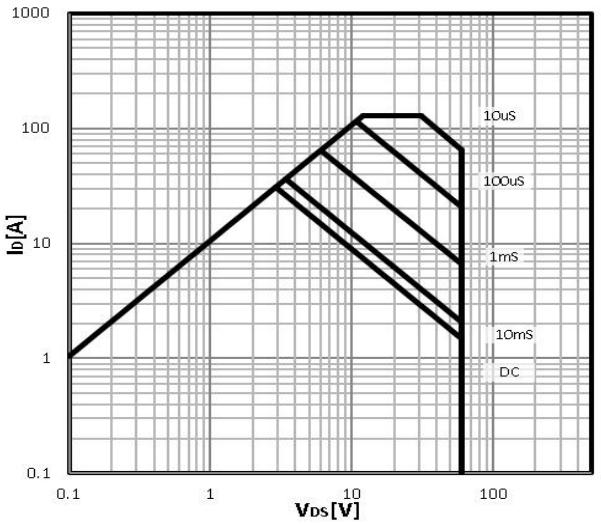


Fig.12 Body Diode Forward Voltage Variation

$-I_F=f(-V_{DS})$

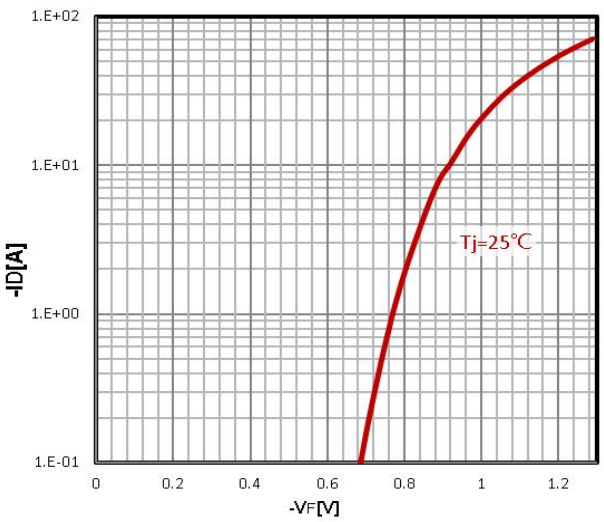
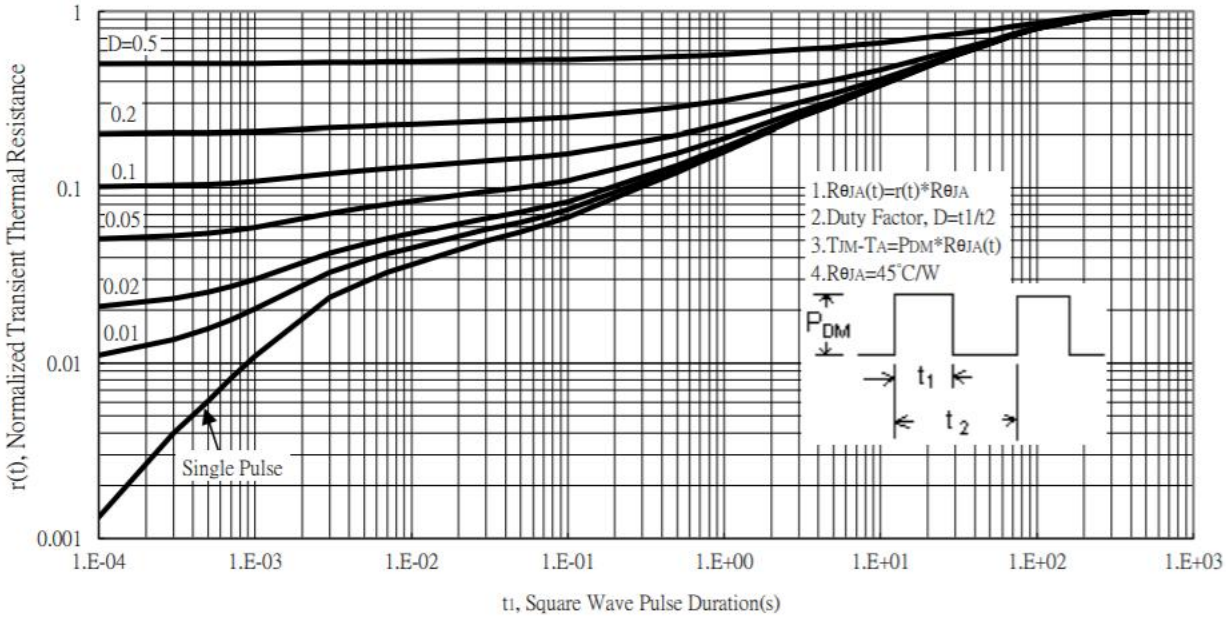
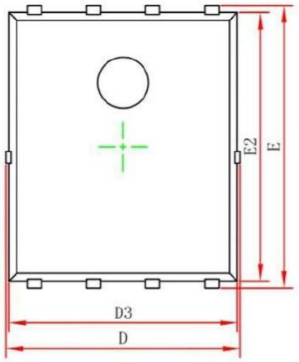


Fig.13 Max. transient thermal impedance

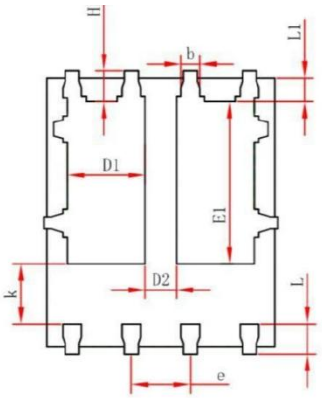
$Z_{thJC}=f(t_p)$



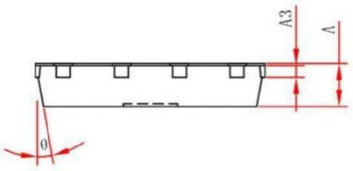
Package Dimensions PDFN5*6-8L



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

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