

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D	$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
60V	40mΩ@10V	18A	-60V	68mΩ@-10V	-13A
	50mΩ@4.5V			75mΩ@-4.5V	

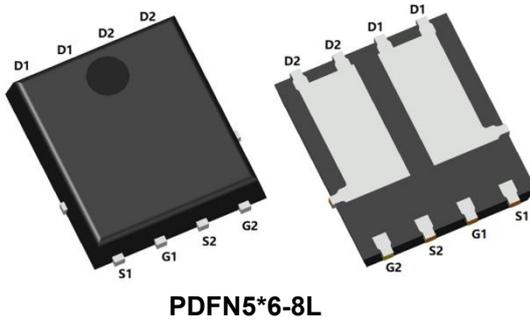
Feature

- Fast switching speed
- Surface mount package

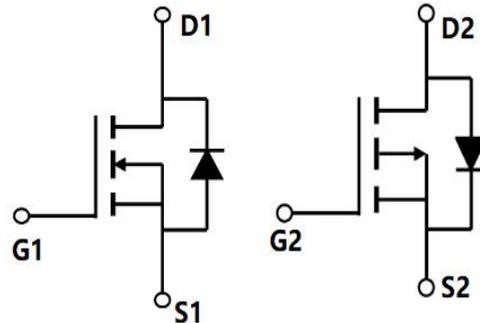
Application

- DC-DC converters
- Motor control

Package



Circuit diagram



Marking



Absolute maximum ratings ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	60	-60	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Continuous Drain Current ($T_C=25^\circ\text{C}$)	I_D	18	-13	A
Continuous Drain Current ($T_C=100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	12	-9	A
Pulsed Drain Current	I_{DM}	72	-52	A
Single Pulse Avalanche Energy ^{1,2)}	E_{AS}	29	48	mJ
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	35	35	W
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	3.6	3.6	$^\circ\text{C}/\text{W}$
Operating Junction Temperature	T_J	-55 ~ +150	-55 ~ +150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 ~ +150	-55 ~ +150	$^\circ\text{C}$

N-CH Electrical characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	60			V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=48\text{V}, V_{GS}=0\text{V}, T_J=25^\circ\text{C}$			1	μA
Gate-body leakage current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1	1.6	2.5	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=4.5\text{A}$		30	40	m Ω
		$V_{GS}=4.5\text{V}, I_D=4\text{A}$		35	50	
Dynamic characteristics⁶⁾						
Input Capacitance	C_{iss}	$V_{DS}=30\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$		1165		pF
Output Capacitance	C_{oss}			53		
Reverse Transfer Capacitance	C_{rss}			46		
Total Gate Charge	Q_g	$V_{DS}=30\text{V}, V_{GS}=10\text{V}, I_D=5\text{A}$		22		nC
Gate-Source Charge	Q_{gs}			2.5		
Gate-Drain Charge	Q_{gd}			3.4		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=30\text{V}, V_{GS}=10\text{V}, I_D=10\text{A}$ $R_G=3\Omega$		4.4		nS
Turn-on rise time	t_r			3.4		
Turn-off delay time	$t_{d(off)}$			16		
Turn-off fall time	t_f			2		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				18	A
Diode Forward voltage	V_{SD}	$V_{GS}=0\text{V}, I_S=1\text{A}, T_J=25^\circ\text{C}$			1.2	V
Reverse Recovery Time	T_{rr}	$I_S=5\text{A}, di/dt=-100\text{A}/\mu\text{s}$		23		nS
Reverse Recovery Charge	Q_{rr}	$T_J=25^\circ\text{C}$		9		nC

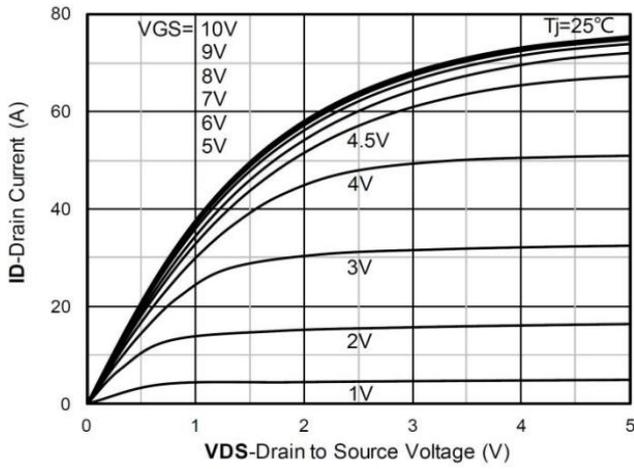
P-CH Electrical characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-60			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = -48V, V _{GS} = 0V, T _J = 25°C			-1	μA
Gate-body leakage current	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1	-1.5	-2.5	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -3.5A		55	68	mΩ
		V _{GS} = -4.5V, I _D = -2.5A		60	75	
Dynamic characteristics⁶⁾						
Input Capacitance	C _{iss}	V _{DS} = -30V, V _{GS} = 0V, f = 1MHz		1090		pF
Output Capacitance	C _{oss}			77		
Reverse Transfer Capacitance	C _{rss}			58		
Total Gate Charge	Q _g	V _{DS} = -30V, V _{GS} = -10V, I _D = -4A		25.7		nC
Gate-Source Charge	Q _{gs}			3		
Gate-Drain Charge	Q _{gd}			3.5		
Turn-on delay time	t _{d(on)}	V _{DS} = -30V, V _{GS} = -10V, I _D = -5A R _G = 3Ω		9		nS
Turn-on rise time	t _r			11		
Turn-off delay time	t _{d(off)}			25		
Turn-off fall time	t _f			12		
Source-Drain Diode characteristics						
Diode Forward Current	I _S				-13	A
Diode Forward voltage	V _{SD}	V _{GS} = 0V, I _S = -1A			-1.2	V
Reverse Recovery Time	T _{rr}	I _S = -4A, di/dt = -100A/μs T _J = 25°C		25		nS
Reverse Recovery Charge	Q _{rr}				30	

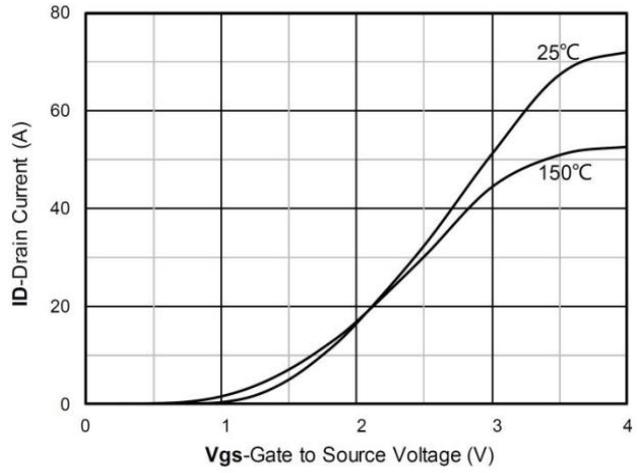
Notes:

- 1) The N-channel EAS test condition is V_{DD} = 30V, V_{GS} = 10V, L = 0.1mH, R_G = 25Ω.
- 2) The P-channel EAS test condition is V_{DD} = -30V, V_{GS} = -10V, L = 0.1mH, R_G = 25Ω.
- 3) Guaranteed by design, not subject to production.

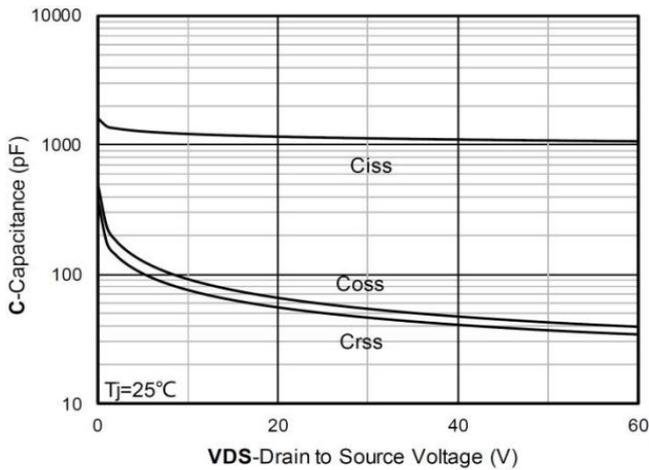
N-Channel Typical Characteristics



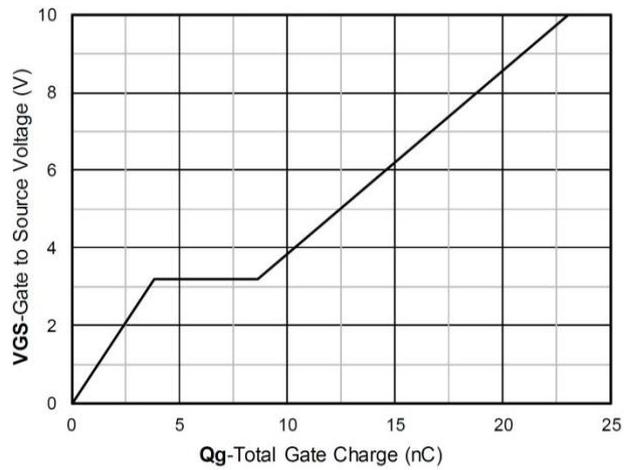
Output Characteristics



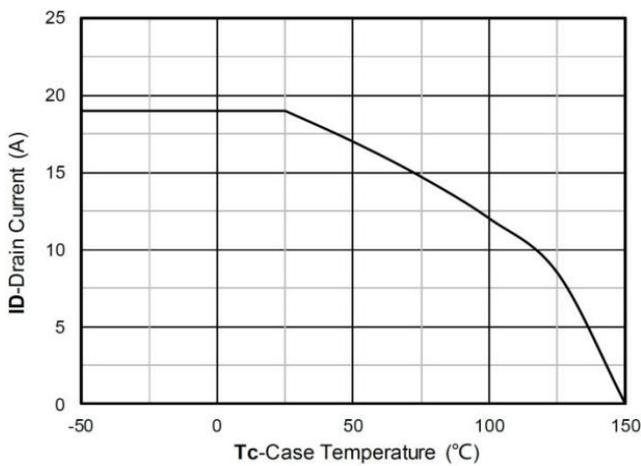
Transfer Characteristics



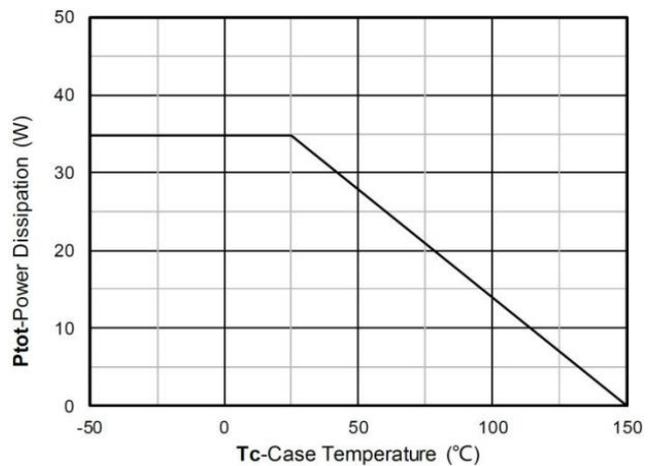
Capacitance Characteristics



Gate Charge

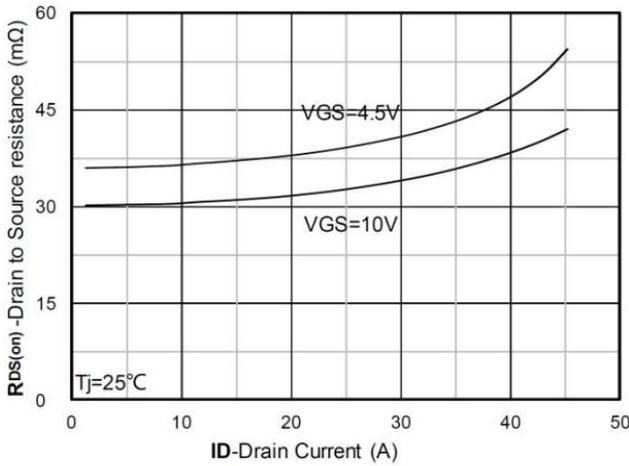


Current dissipation

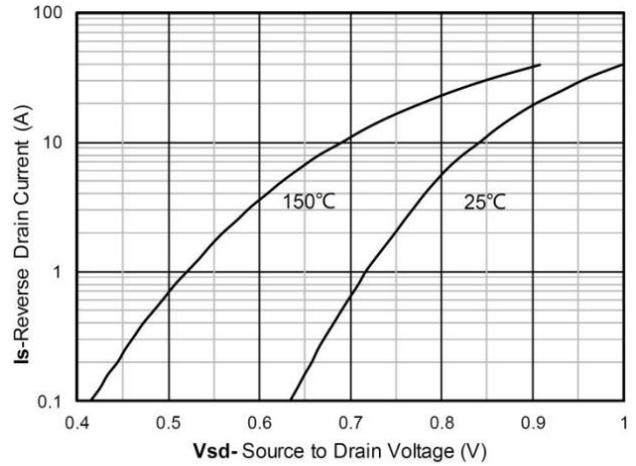


Power dissipation

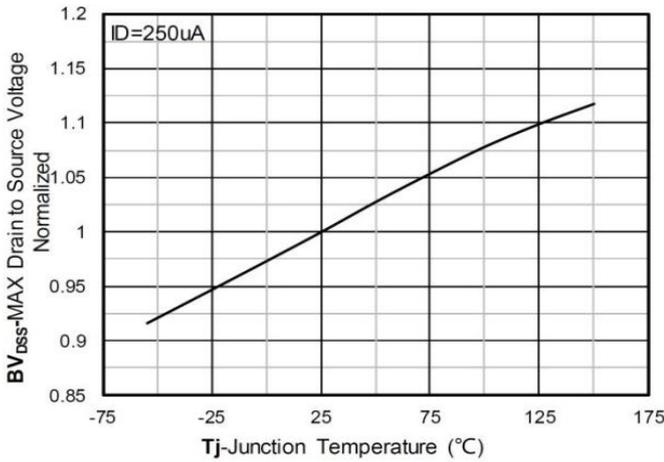
N-Channel Typical Characteristics



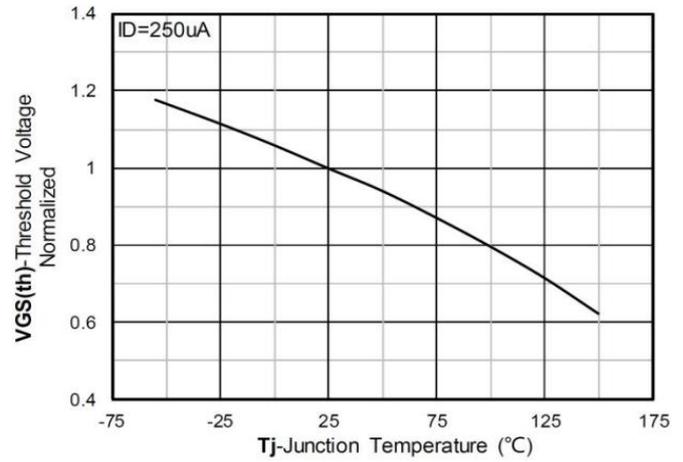
RDS(on) VS Drain Current



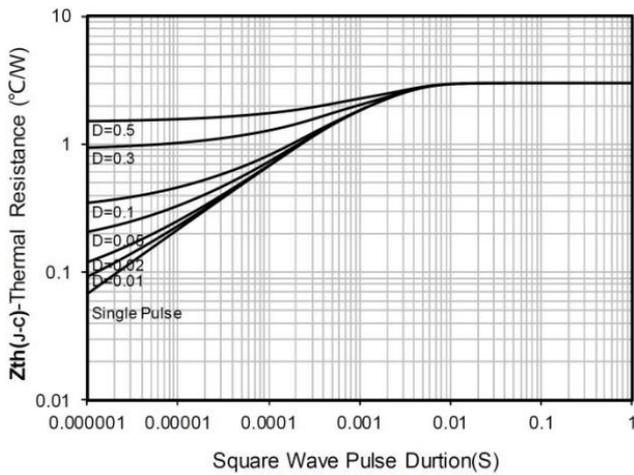
Forward characteristics of reverse diode



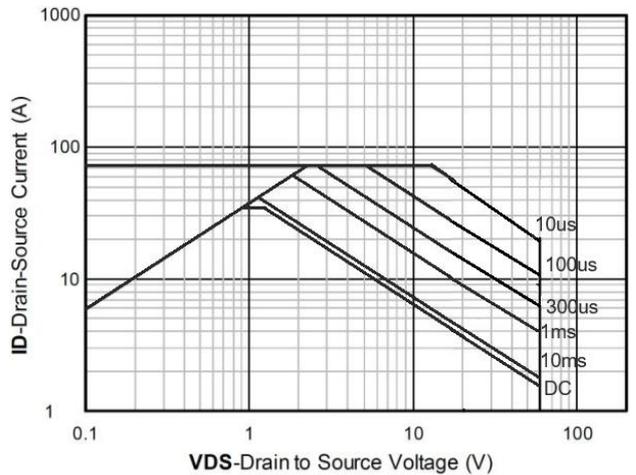
Normalized breakdown voltage



Normalized Threshold voltage

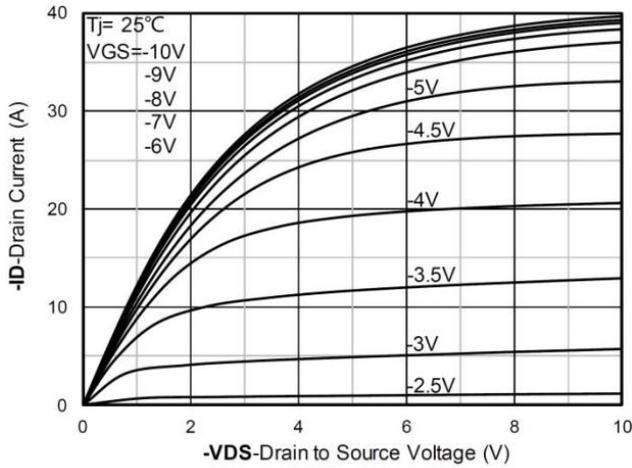


Maximum Transient Thermal Impedance

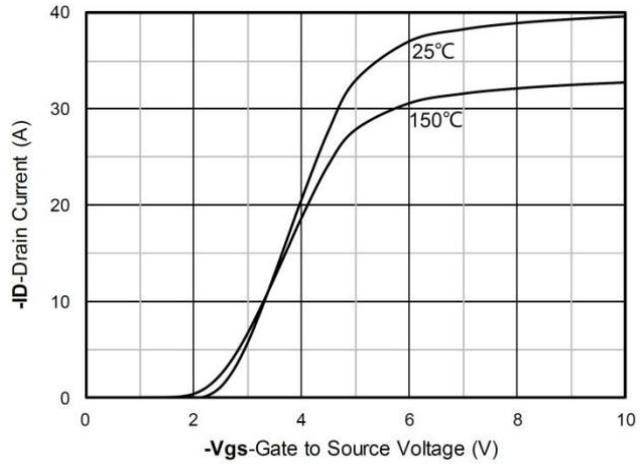


Safe Operation Area

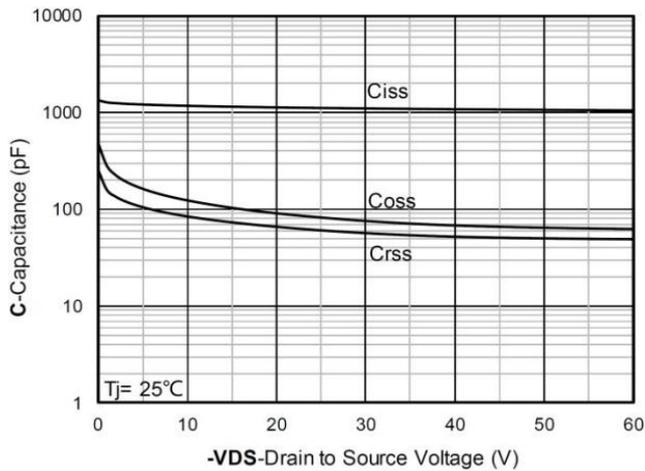
P-Channel Typical Characteristics



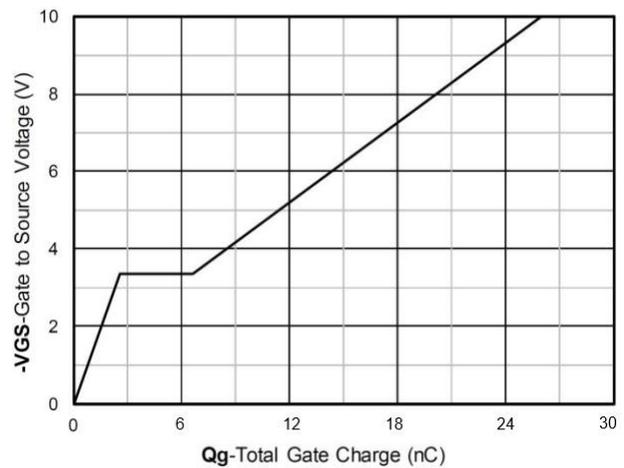
Output Characteristics



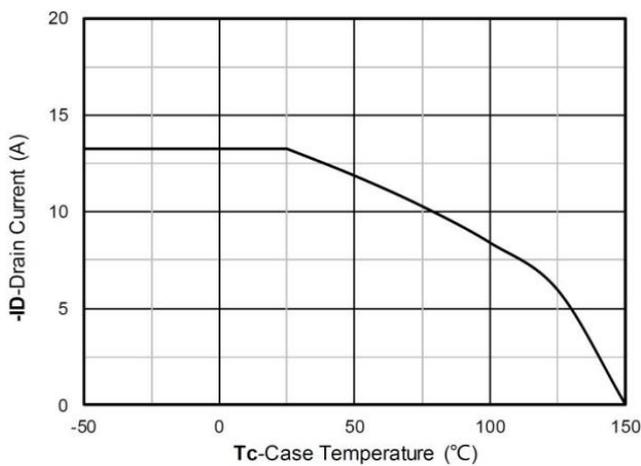
Transfer Characteristics



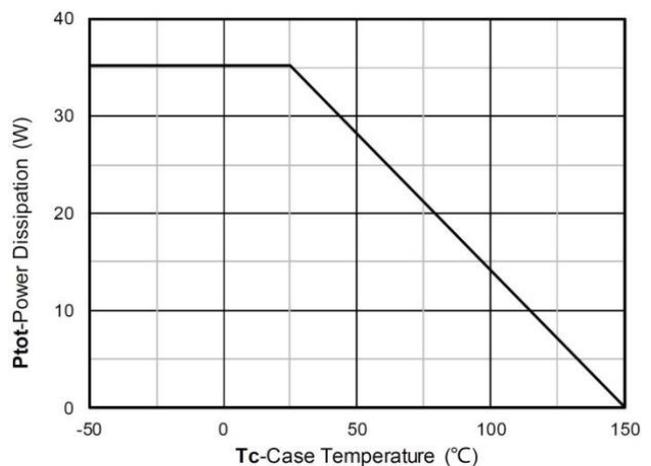
Capacitance Characteristics



Gate Charge

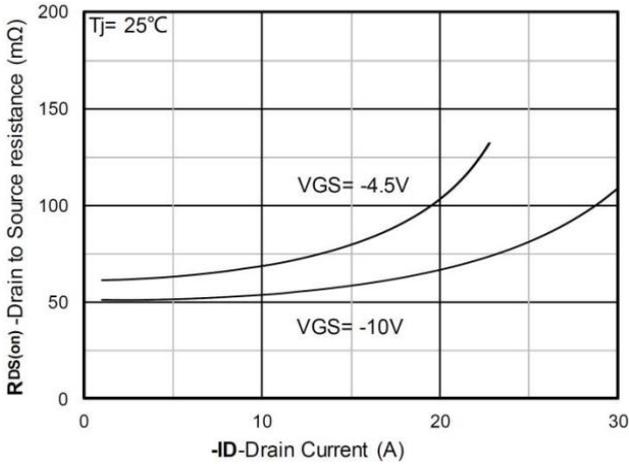


Current dissipation

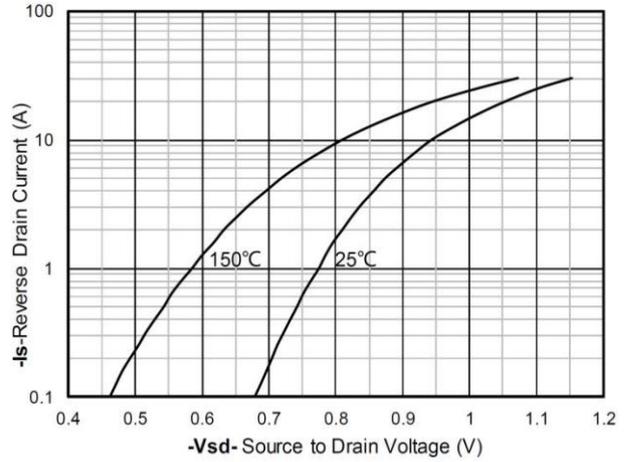


Power dissipation

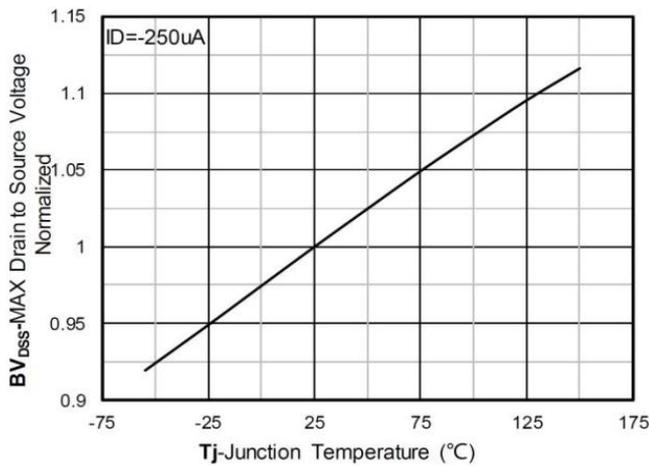
P-Channel Typical Characteristics



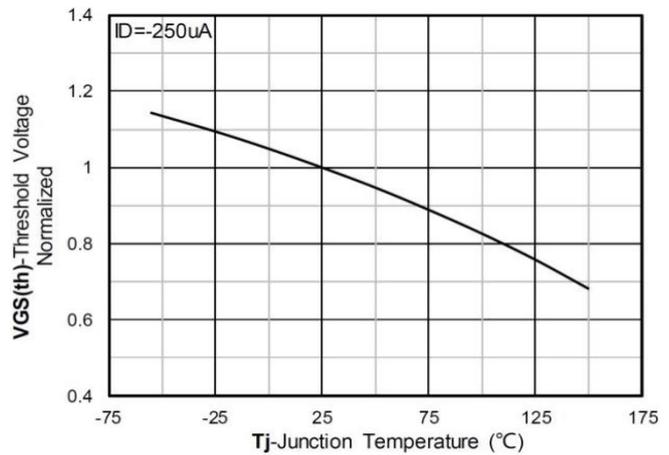
RDS(on) VS Drain Current



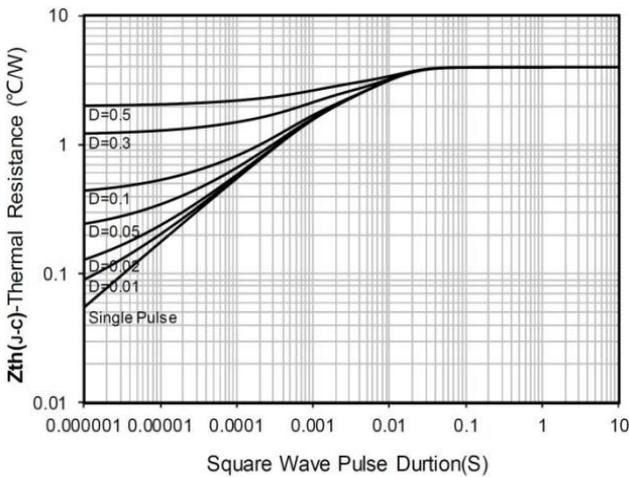
Forward characteristics of reverse diode



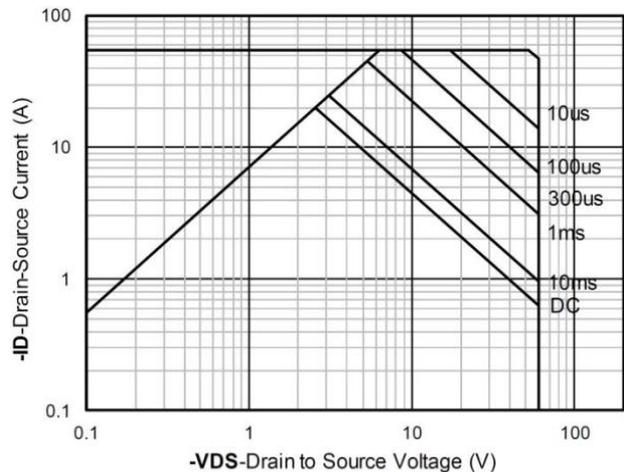
Normalized breakdown voltage



Normalized Threshold voltage

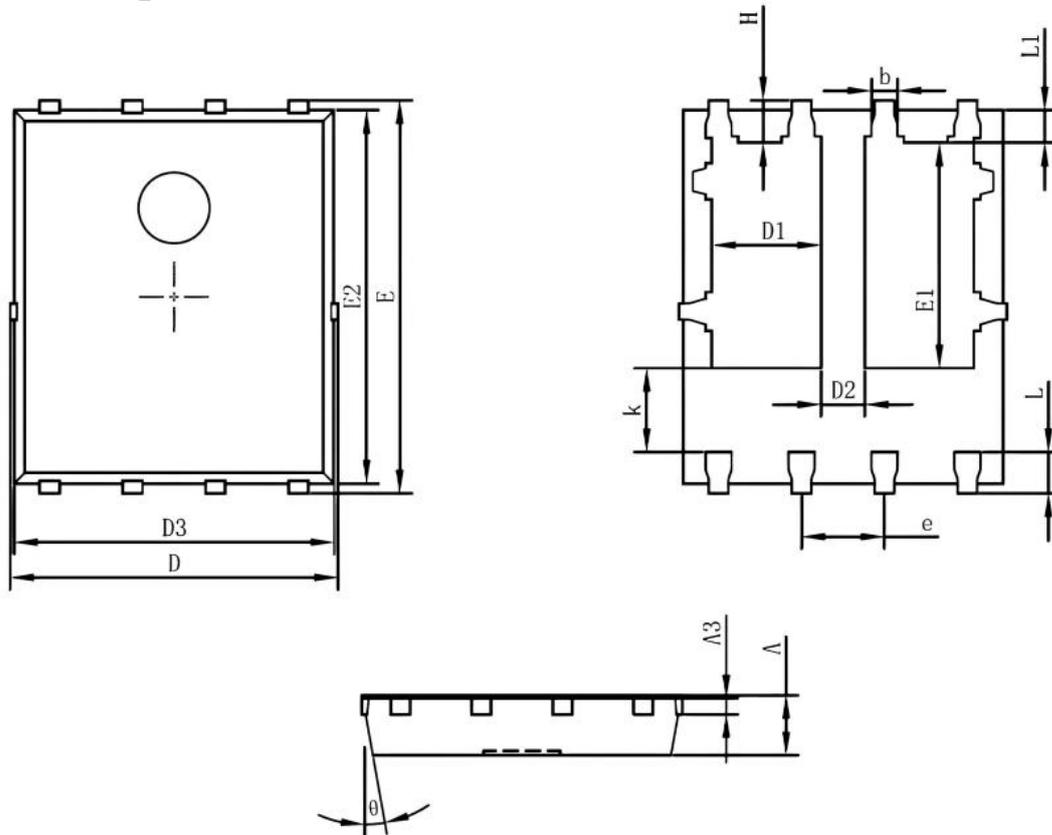


Maximum Transient Thermal Impedance



Safe Operation Area

PDFN5*6-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254 REF.		0.010 REF.	
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	1.270 TYP.		0.050 TYP.	
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°