



Features

- Excellent Gate Charge × R_{DS(on)} (FOM)
- Ultra-low on-resistance
- Smooth switching
- 100% avalanche tested
- Excellent package for good heat dissipation

Application

- Battery management
- Load switch
- Battery protection

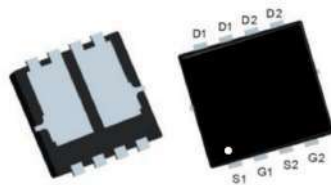
Product Summary

• N-Channel

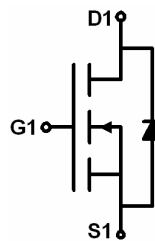
V_{DS}		30	V
$R_{DS(on), Typ}$	$V_{GS}=10V$	7.6	m Ω
$R_{DS(on), Typ}$	$V_{GS}=4.5V$	11.5	m Ω
I_D		40	A

• P-Channel

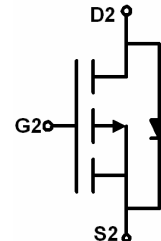
V_{DS}		-30	V
$R_{DS(on), Typ}$	$V_{GS}=-10V$	16	m Ω
$R_{DS(on), Typ}$	$V_{GS}=-4.5V$	21	m Ω
I_D		-9	A



PDFN 3.3*3.3-8



N-channel



P-channel

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}	± 20	± 20	V
Continuous Drain Current	I_D	40	-9	A
Pulsed Drain Current (Note 1)	I_{DM}	148	-108	A
Maximum Power Dissipation	P_D	20.8	20.8	W
Single Pulsed Avalanche Energy	EAS	40	17.6	mJ
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 (Note2)	$R_{\theta JA}$	N-Ch	62.5	$^\circ\text{C/W}$
		P-Ch	62.5	
Thermal Resistance, Junction-to-Case, Steady-State	$R_{\theta JC}$	N-Ch	6	$^\circ\text{C/W}$
		P-Ch	6	

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 29.5 V, V _{GS} = 0 V			1	μA
I _{GSS}	Gate Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
V _{GS(TH)}	Gate Threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	1	1.65	2.5	V
R _{DS(On)}	Drain-Source on-state resistance	V _{GS} = 10 V, I _D = 20 A		7.6	10	mΩ
		V _{GS} = 4.5 V, I _D = 10 A		11.5	18.5	mΩ
g _{FS}	Forward Transconductance	V _{DS} = 5 V, I _D = 15 A ^(Note 5)	10	-	-	S
Dynamic Characteristics						
C _{ISS}	Input capacitance	V _{DS} =15 V, V _{GS} =0 V, f=1.0 MHz		682		pF
C _{OSS}	Output capacitance			105		pF
C _{RSS}	Reverse transfer capacitance			83		pF
R _G	Gate resistance	f=1MHZ		2.3		Ω
Switching Characteristics						
T _{D(ON)}	Turn On Delay Time	V _{DD} =15 V, I _D =20 A, V _{GS} =10 V, R _G =3 Ω ^(Note 5, 6)		3		ns
T _R	Rising Time			2		ns
T _{D(OFF)}	Turn Off Delay Time			13		ns
T _F	Fall Time			6		ns
Q _G	Total Gate Charge	V _{DD} =15 V, I _D =10 A, V _{GS} =10 V ^(Note 5, 6)		13		nC
Q _{GS}	Gate-Source Charge			1.5		nC
Q _{GD}	Gate-Drain Charge			2.6		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current				37	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				148	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 20 A		0.8	1.2	V
T _{RR}	Reverse recovery time	I _F =20 A, di/dt=100 A/μS		12		ns
Q _{RR}	Reverse recovery charge			2		nC

Notes:

1. The max drain current rating is package limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. $L = 0.5\text{ mH}$, $V_{DD} = 15\text{ V}$, $I_{AS}=12\text{ A}$, $R_G = 25\text{ }\Omega$, Starting $T_J = 25^{\circ}\text{C}$
4. Mount on 1 inch X 1 inch 2 oz FR-4 copper PCB
5. Pulse Test: Pulse width $\leq 300\text{ }\mu\text{s}$, Duty cycle $\leq 2\%$
6. Essentially independent of operating temperature

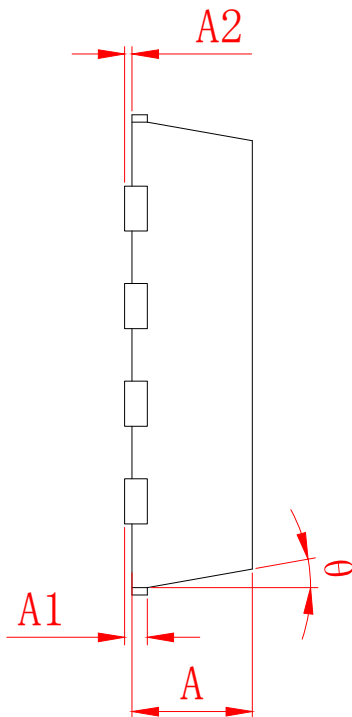
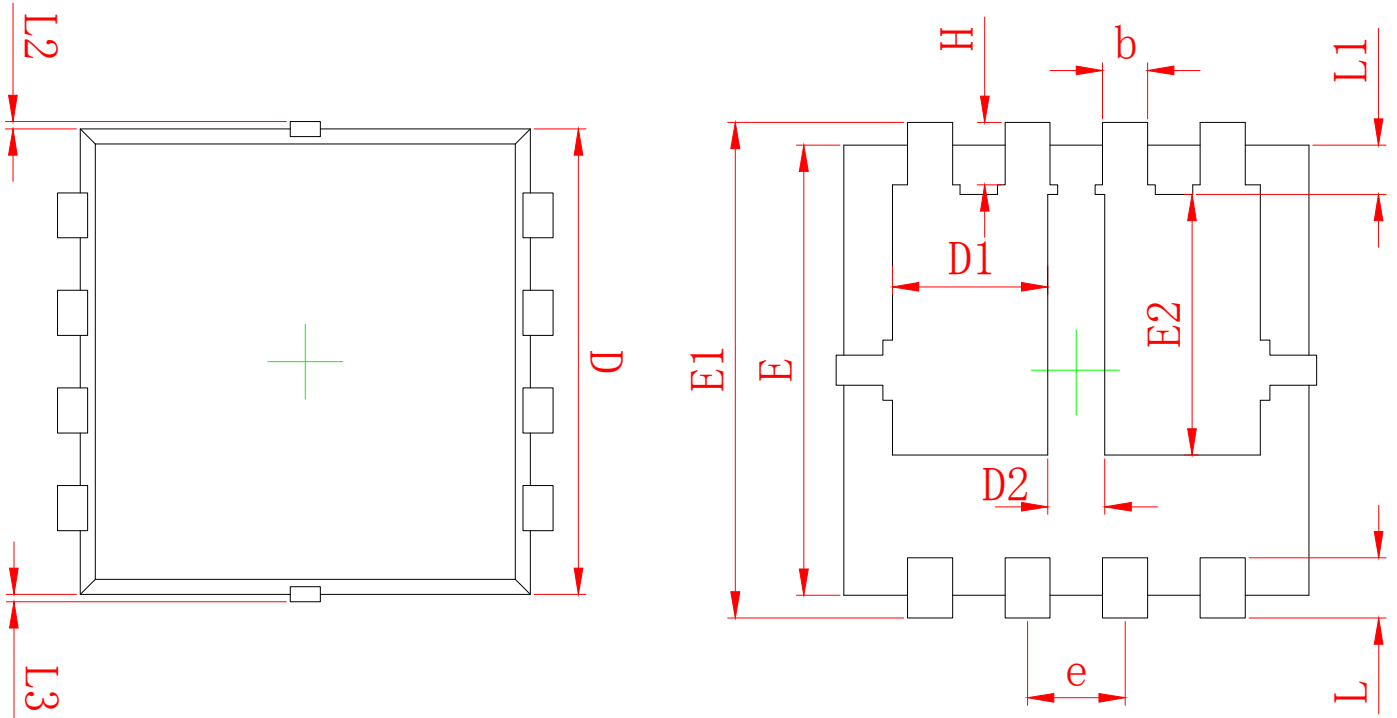
P-CH Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = -250 μA	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -30 V, V _{GS} = 0 V			-1	μA
I _{GSSF}	Gate Leakage Current, Forward	V _{GS} = 20 V, V _{DS} = 0 V			100	nA
I _{GSSR}	Gate Leakage Current, Reverse	V _{GS} = -20 V, V _{DS} = 0 V			-100	nA
On Characteristics						
V _{GS(TH)}	Gate Threshold voltage	V _{DS} = V _{GS} , I _D = -250 uA	-1	-1.5	-2.5	V
R _{DS(On)}	Drain-Source on-state resistance	V _{GS} = -10 V, I _D = -9 A		16	20	mΩ
		V _{GS} = -4.5 V, I _D = -5 A		21	27	mΩ
g _{FS}	Forward Transconductance	V _{DS} = -5 V, I _D = -6 A (Note 3)		20		S
Dynamic Characteristics						
C _{iss}	Input capacitance	VDS=-15V, VGS=0V, F=1.0Mhz		1015		pF
C _{oss}	Output capacitance			138		pF
C _{rss}	Reverse transfer capacitance			11		pF
Switching Characteristics						
t _{d(on)}	Turn On Delay Time	VDD=-15V, ID=-6A, VGS=-10V, RG=1Ω (Note 3, 4)		6.8		ns
t _r	Rising Time			5		ns
t _{d(off)}	Turn Off Delay Time			17		ns
t _f	Fall Time			6.3		ns
Q _g	Total Gate Charge	VDS=-15V, ID=-6A, VGS=-10V (Note 3, 4)		8.3		nC
Q _{gs}	Gate-Source Charge			1.4		nC
Q _{gd}	Gate-Drain Charge			2		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current				-27	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current				-108	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = -6 A		-0.8	-1.2	V

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. EAS condition: $T_J=25^{\circ}\text{C}, V_{DD}=-15\text{V}, V_{GS}=-10\text{V}, L=0.5\text{mH}, R_g=25\Omega$
3. Pulse Test : Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$
4. Essentially independent of operating temperature

PDFN3.3*3.3-8 Package Outline Data



SYMBOL	MILLIMETER	
	MIN	MAX
A	0.700	0.900
A1	0.152 REF.	
A2	0~0.05	
D	3.000	3.200
D1	0.935	1.135
D2	0.280	0.480
E	2.900	3.100
E1	3.150	3.450
E2	1.535	1.935
b	0.200	0.400
e	0.550	0.750
L	0.300	0.500
L1	0.180	0.480
L2	0~0.100	
L3	0~0.100	
H	0.315	0.515
θ	8°	12°