

N-Channel Enhancement Mode MOSFET

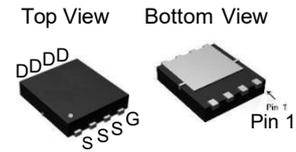
Features

- 20V/60A,
 $R_{DS(ON)} = 4.2m\Omega(Typ.) @ V_{GS} = 4.5V$
 $R_{DS(ON)} = 5.5m\Omega(Typ.) @ V_{GS} = 2.5V$
- Avalanche Rated
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

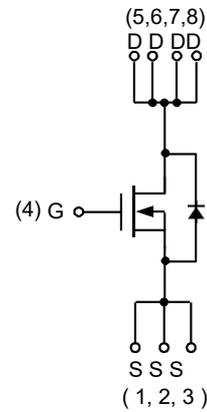
Applications

- Power Management in Notebook Computer, Portable Equipment and Battery Powered Systems.

Pin Description



PDFN3x3-8L_EP1_P



N-Channel MOSFET

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit	
Common Ratings ($T_A = 25^\circ\text{C}$ Unless Otherwise Noted)				
V_{DSS}	Drain-Source Voltage	20	V	
V_{GSS}	Gate-Source Voltage	± 12		
T_J	Maximum Junction Temperature	150	$^\circ\text{C}$	
T_{STG}	Storage Temperature Range	-55 to 150		
I_S	Diode Continuous Forward Current	$T_C = 25^\circ\text{C}$	60 _a	A
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	60 _a	
		$T_C = 100^\circ\text{C}$	25	
P_D	Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	24	W
		$T_C = 100^\circ\text{C}$	9.6	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	4.2	$^\circ\text{C}/\text{W}$
I_D	Continuous Drain Current	$T_A = 25^\circ\text{C}$	12	A
		$T_A = 70^\circ\text{C}$	9.5	
I_{DM}	Pulsed Drain Current	$T_A = 25^\circ\text{C}$	40 ^b	
P_D	Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	2	W
		$T_A = 70^\circ\text{C}$	1.3	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	42	$^\circ\text{C}/\text{W}$
		Steady State	62	
I_{AS}^c	Avalanche Current, Single pulse ($L = 0.1\text{mH}$)		24	A
E_{AS}^c	Avalanche Energy, Single pulse ($L = 0.2\text{mH}$)		28.8	mJ

Note a: Package is limited to 40A.

Note b: Pulse width limited by max. junction temperature.

Note c: UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_J = 25^\circ\text{C}$).

Electrical Characteristics (Cont.) (T_A= 25°C Unless Otherwise Noted)

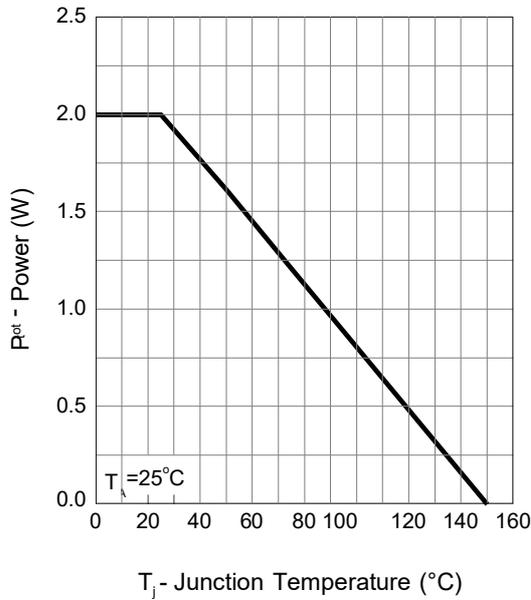
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V	-	-	1	μA
		T _J =85°C	-	-	30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	0.4	0.7	1.2	V
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^d	Drain-Source On-state Resistance	V _{GS} =4.5V, I _{DS} =10A	-	4.2	5.5	mΩ
		V _{GS} =2.5V, I _{DS} =9A	-	5.5	6.5	
Diode Characteristics						
V _{SD} ^d	Diode Forward Voltage	I _{SD} =2A, V _{GS} =0V	-	0.75	1.1	V
t _{rr} ^e	Reverse Recovery Time	I _{SD} =12A, dI _{SD} /dt=100A/μs	-	6.6	-	ns
t _a	Charge Time		-	3.9	-	
t _b	Discharge Time		-	2.6	-	
Q _{rr} ^e	Reverse Recovery Charge		-	2	-	
Dynamic Characteristics^e						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz	-	2.5	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, Frequency=1.0MHz	592	740	888	pF
C _{oss}	Output Capacitance		133	190	247	
C _{rss}	Reverse Transfer Capacitance		44	74	104	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =15V, R _L =15Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	-	9	17	ns
t _r	Turn-on Rise Time		-	12	23	
t _{d(OFF)}	Turn-off Delay Time		-	23	42	
t _f	Turn-off Fall Time		-	6	12	
Gate Charge Characteristics^e						
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =10V, I _{DS} =12A	-	14.5	21	nC
Q _g	Total Gate Charge	V _{DS} =15V, V _{GS} =4.5V, I _{DS} =12A	-	6.8	9.5	
Q _{gth}	Threshold Gate Charge		-	1.1	1.5	
Q _{gs}	Gate-Source Charge		-	2.4	3.3	
Q _{gd}	Gate-Drain Charge		-	3.9	5.4	

Note d: Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%.

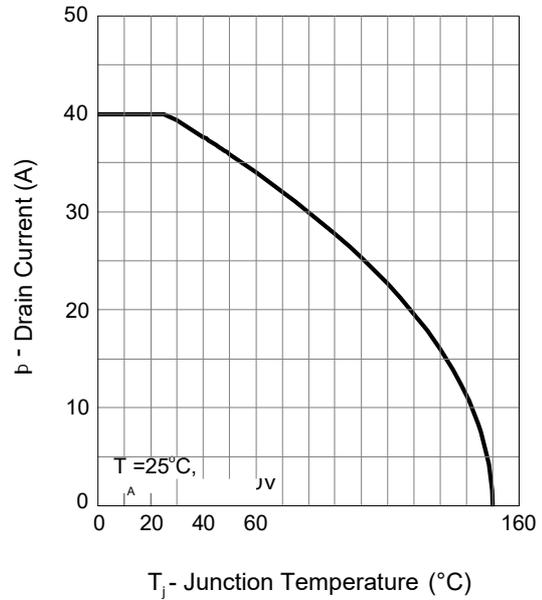
Note e: Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

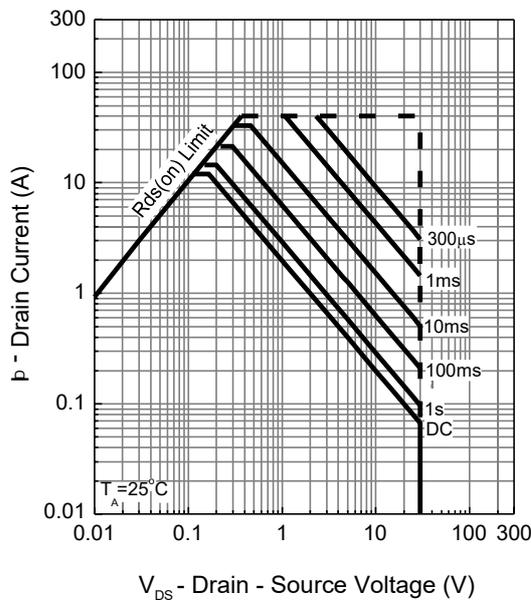
Power Dissipation



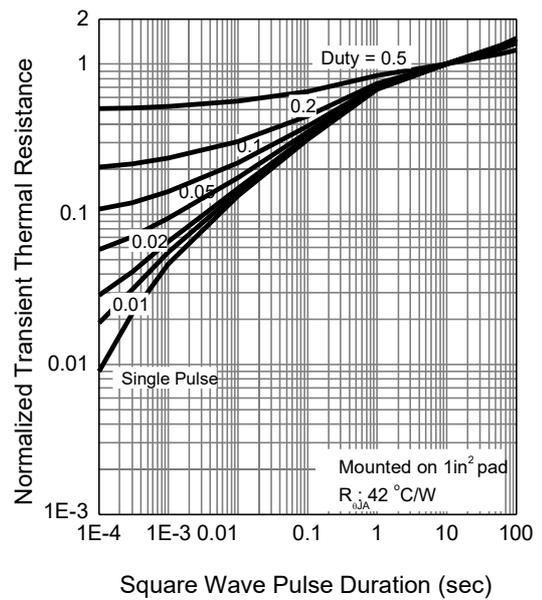
Drain Current



Safe Operation Area

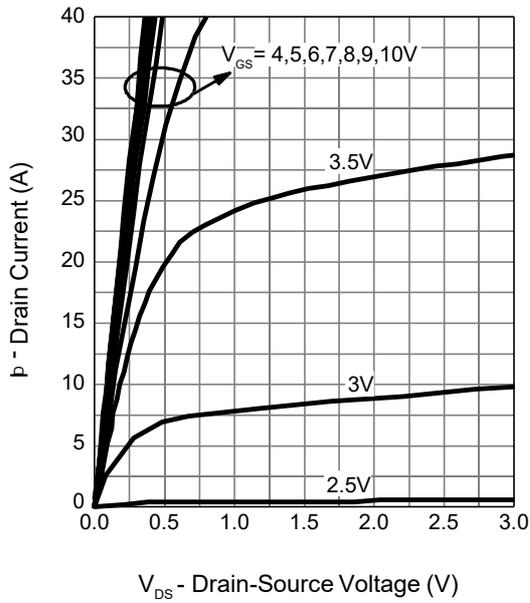


Thermal Transient Impedance

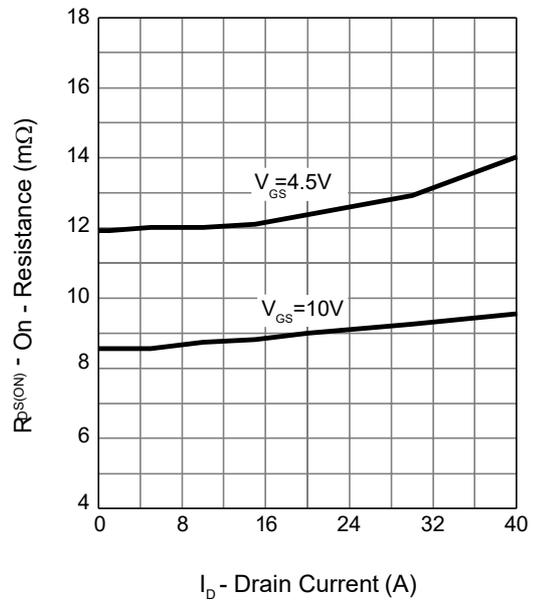


Typical Operating Characteristics (Cont.)

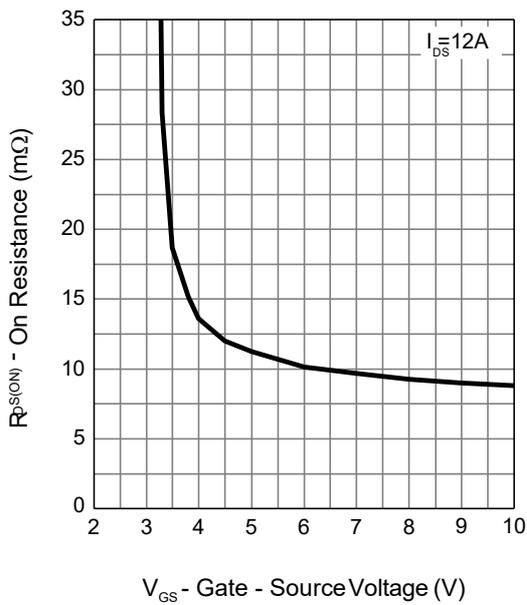
Output Characteristics



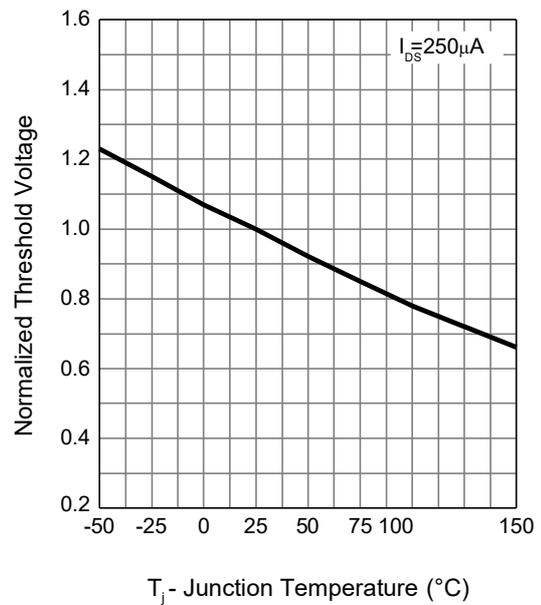
Drain-Source On Resistance



Gate-Source On Resistance

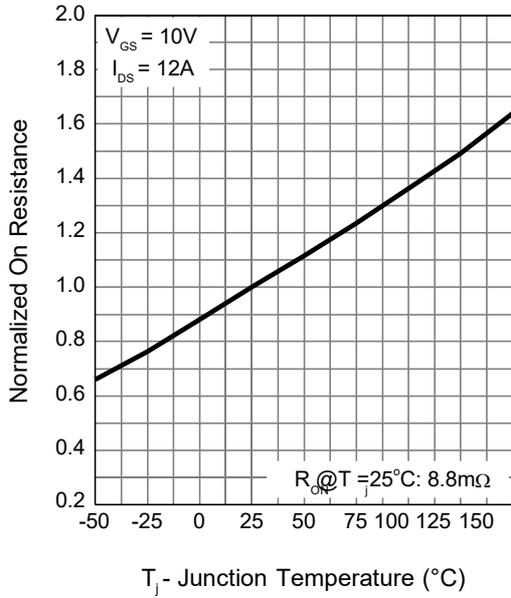


Gate Threshold Voltage

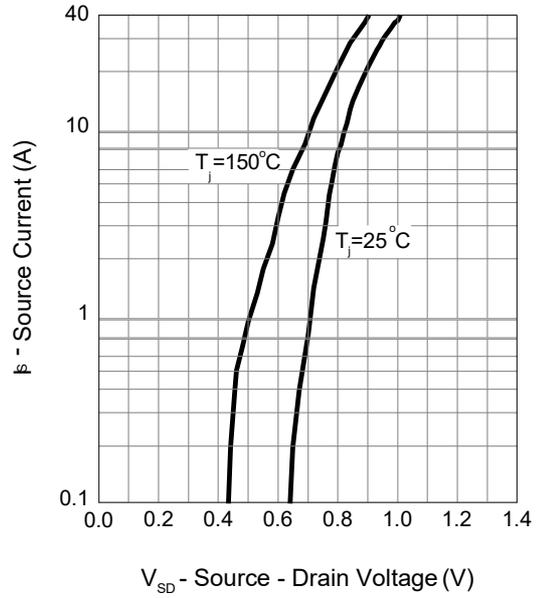


Typical Operating Characteristics (Cont.)

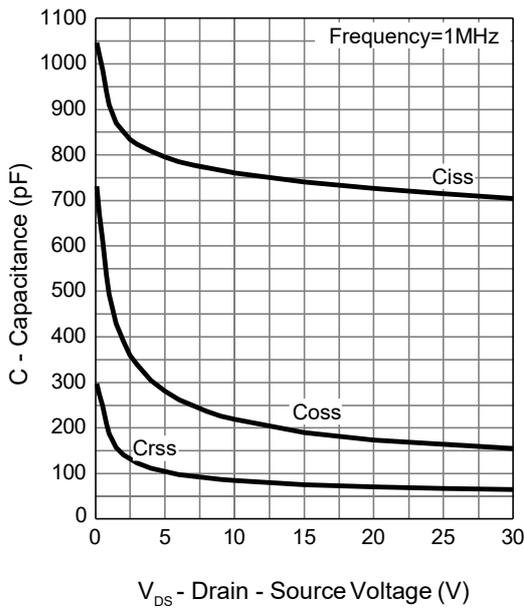
Drain-Source On Resistance



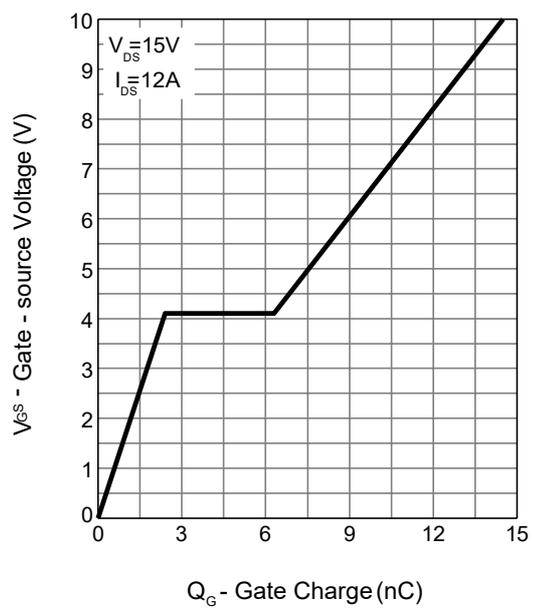
Source-Drain Diode Forward



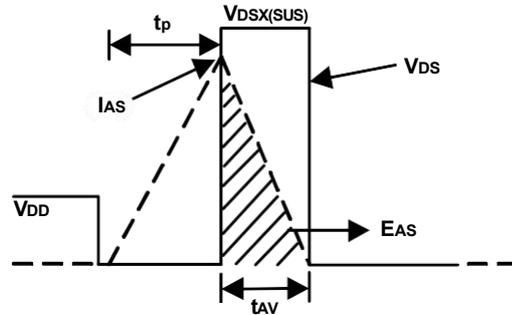
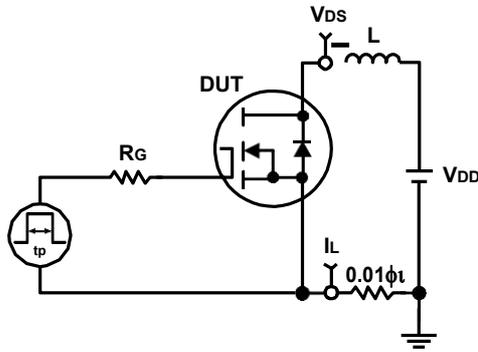
Capacitance



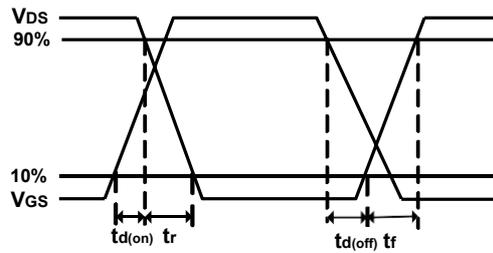
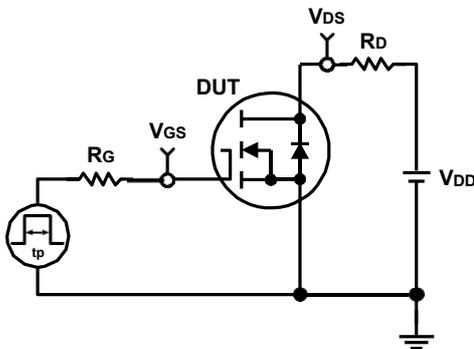
Gate Charge



Avalanche Test Circuit and Waveforms

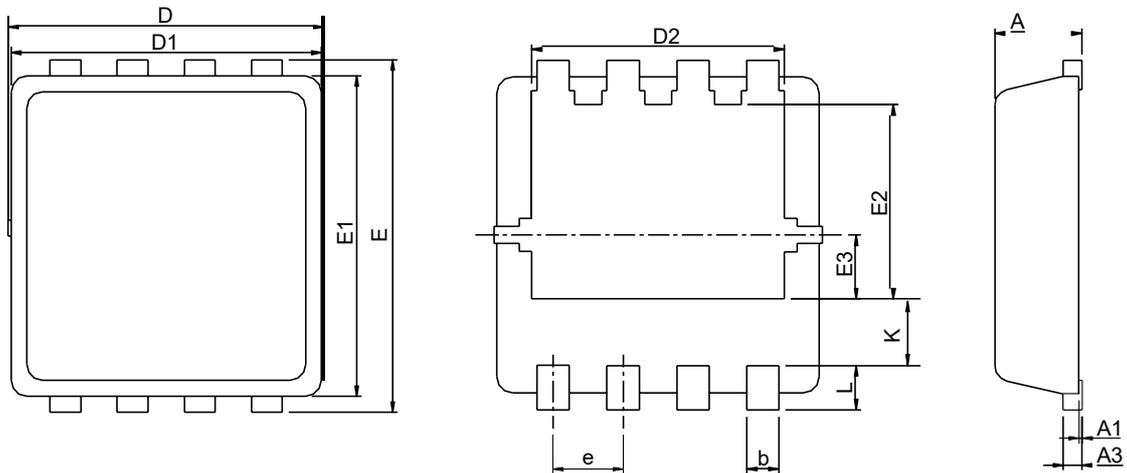


Switching Time Test Circuit and Waveforms



Package Information

PDFN3x3-8L_EP1_P



SYMBOL	PDFN3x3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.80	1.00	0.031	0.039
A1	0.00	0.05	0.000	0.002
A3	0.10	0.25	0.004	0.010
b	0.24	0.35	0.009	0.014
D	2.90	3.30	0.114	0.130
D1	2.90	3.10	0.114	0.122
D2	2.25	2.45	0.089	0.096
E	3.10	3.30	0.122	0.130
E1	2.90	3.10	0.114	0.122
E2	1.65	1.85	0.065	0.073
E3	0.56	0.58	0.022	0.023
e	0.65 BSC		0.026 BSC	
K	0.475	0.775	0.019	0.031
L	0.30	0.50	0.012	0.020

RECOMMENDED LAND PATTERN

