



TM120P02NF

P-Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

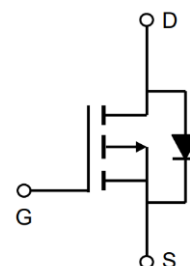
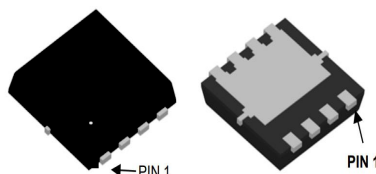
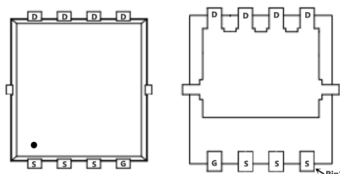
General Features

 $V_{DS} = -20V$ $I_D = -120A$ $R_{DS(ON)} = 1.6m\Omega(\text{typ.}) @ V_{GS} = -10V$

100% UIS Tested

100% R_g Tested

NF:DFN5x6-8L



Marking: 120P02 OR 6411

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

Symbol	Parameter		Rating	Unit
Common Ratings				
V _{DSS}	Drain-Source Voltage		-20	V
V _{GSS}	Gate-Source Voltage		±12	
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	
I _S	Diode Continuous Forward Current	T _C =25°C	-120 ^a	A
I _D	Continuous Drain Current	T _C =25°C	-120 ^a	
		T _C =100°C	-80 ^a	
I _{DM} ^b	Pulsed Drain Current	T _C =25°C	-388	
P _D	Maximum Power Dissipation	T _C =25°C	104	W
		T _C =100°C	41.6	
R _{θJC}	Thermal Resistance-Junction to Case	Steady State	1.2	°C/W
R _{θJA} ^c	Thermal Resistance-Junction to Ambient	Steady State	60	°C/W
I _{AS} ^d	Avalanche Current, Single pulse	L=0.5mH	-22	A
E _{AS} ^d	Avalanche Energy, Single pulse	L=0.5mH	121	mJ

Note a : Package is limited to 100A.

b : Pulse width limited by max. junction temperature.

c : Surface Mounted on 1in^2 pad area.d : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature $T_J = 25^\circ\text{C}$).



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Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

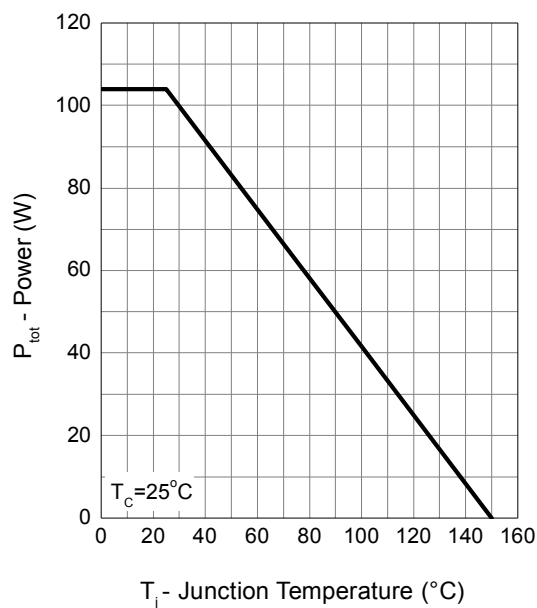
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} = -250μA	-20	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-16V, V _{GS} =0V T _J =85°C	-	-	1 30	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} = -250μA	-0.5	-0.85	-1.3	V
I _{GSS}	Gate Leakage Current	V _{GS} =±12V, V _{DS} =0V	-	-	±100	nA
R _{DS(ON)} ^e	Drain-Source On-state Resistance	V _{GS} =-10V, I _{DS} =-20A V _{GS} =-4.5V, I _{DS} =-20A V _{GS} =-2.5V, I _{DS} =-20A	-	1.6 2 2.7	2 2.5 4.2	mΩ
Diode Characteristics						
V _{SD} ^e	Diode Forward Voltage	I _{SD} =-1A V _{GS} =0V	-0.3	-0.6	-1.0	V
t _{rr}	Reverse Recovery Time	I _{SD} =-20A, dI _{SD} /dt=100A/μs	-	75	-	ns
Q _{rr}	Reverse Recovery Charge		-	75	-	nC
Dynamic Characteristics ^f						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	2.3	-	Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-10V, Frequency=1.0MHz	-	9500		pF
C _{oss}	Output Capacitance		-	2450	-	
C _{rss}	Reverse Transfer Capacitance		-	2250	-	
t _{d(ON)}	Turn-on Delay Time	V _{DD} =-10V, R _L =10Ω, I _{DS} =-1A, V _{GEN} =-10V, R _G =6Ω	-	23	42	ns
t _r	Turn-on Rise Time		-	29	53	
t _{d(OFF)}	Turn-off Delay Time		-	720	1300	
t _f	Turn-off Fall Time		-	330	600	
Gate Charge Characteristics ^f						
Q _g	Total Gate Charge	V _{DS} =-10V, V _{GS} =-4.5V, I _{DS} =-20A	-	140	196	nC
Q _{gs}	Gate-Source Charge		-	22	-	
Q _{gd}	Gate-Drain Charge		-	41	-	

Note e : Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

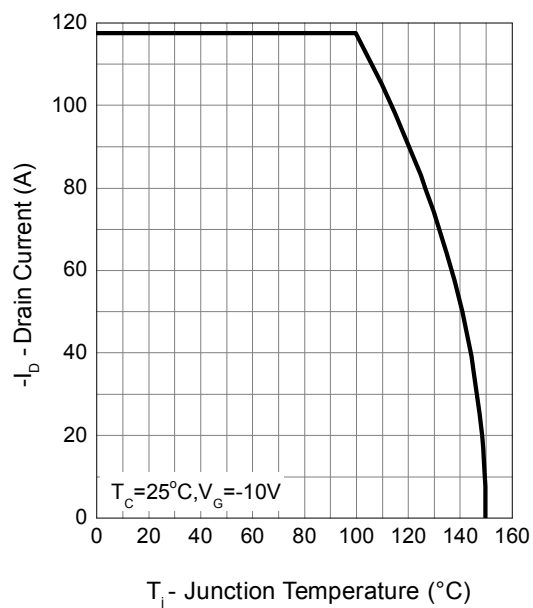
Note f : Guaranteed by design, not subject to production testing.

Typical Electrical And Thermal Characteristics (Curves)

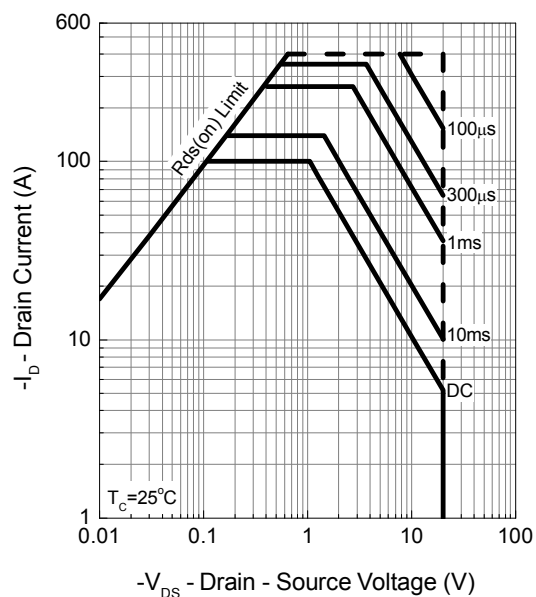
Power Dissipation



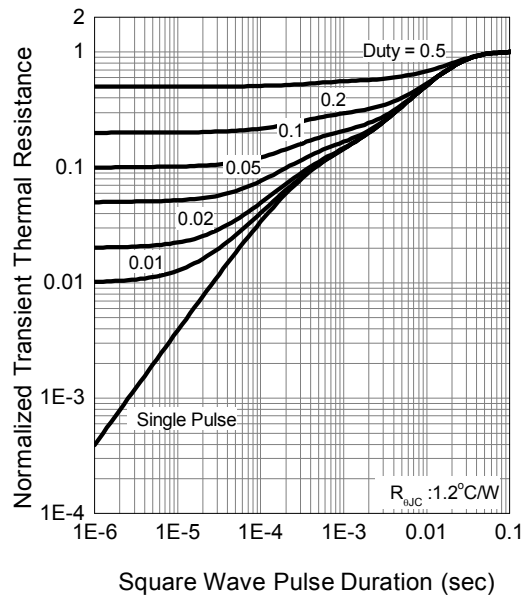
Drain Current



Safe Operation Area



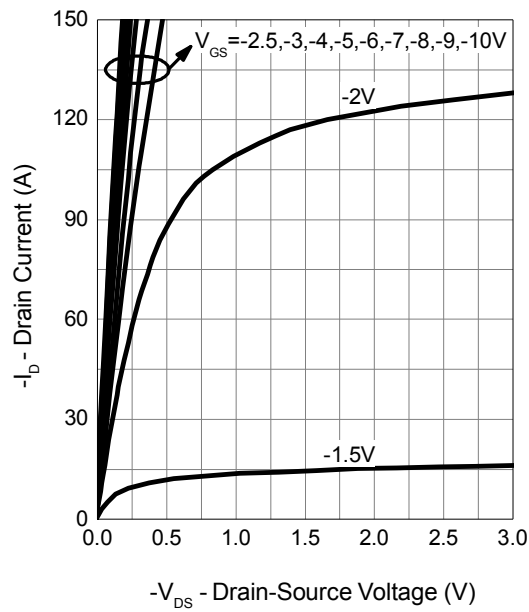
Thermal Transient Impedance



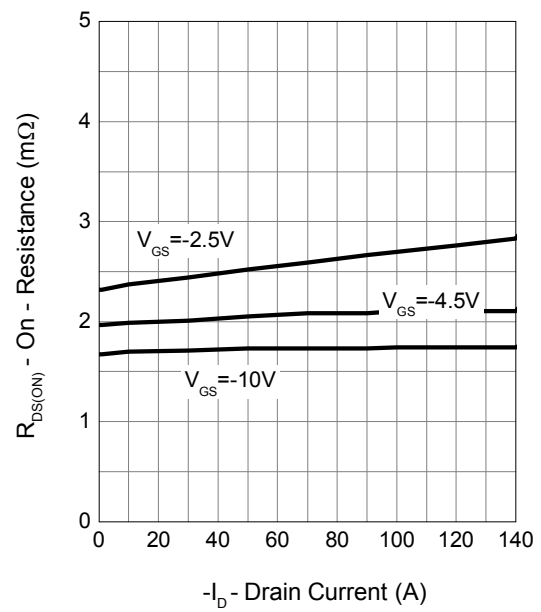
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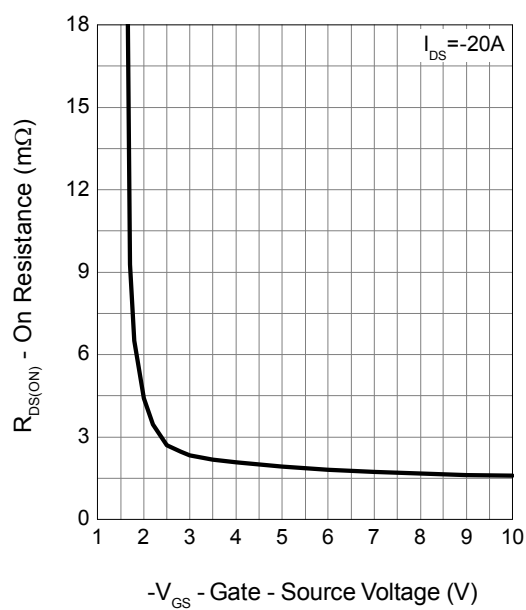
Output Characteristics



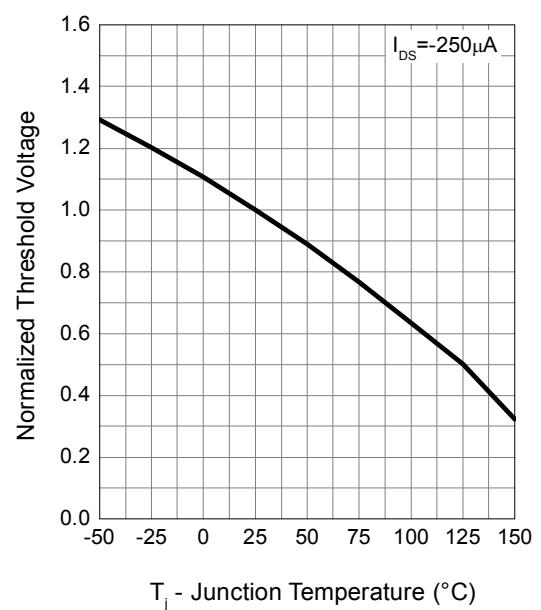
Drain-Source On Resistance



Gate-Source On Resistance

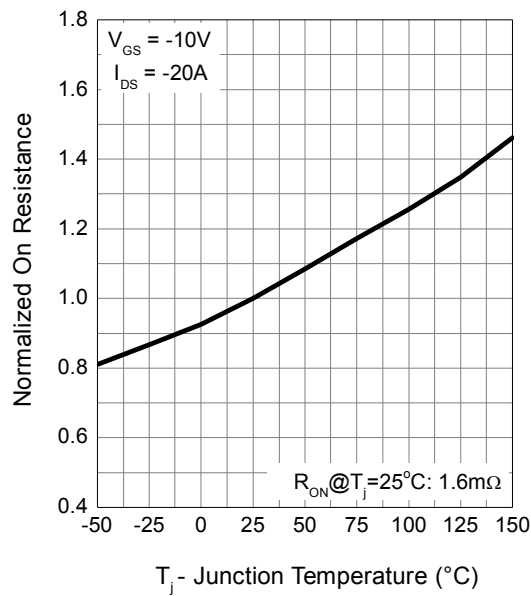


Gate Threshold Voltage

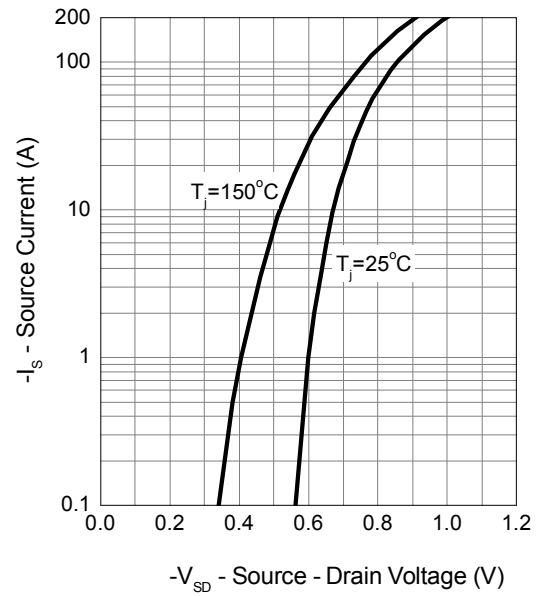




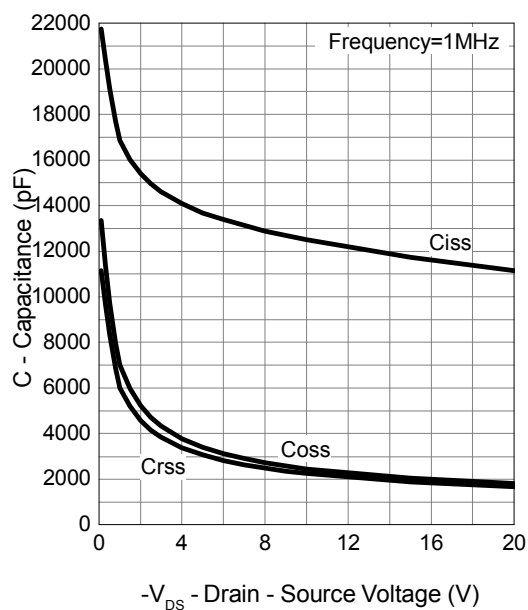
Drain-Source On Resistance



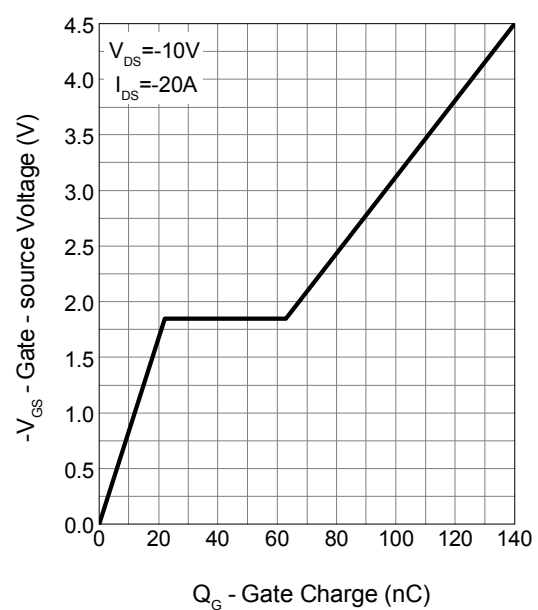
Source-Drain Diode Forward



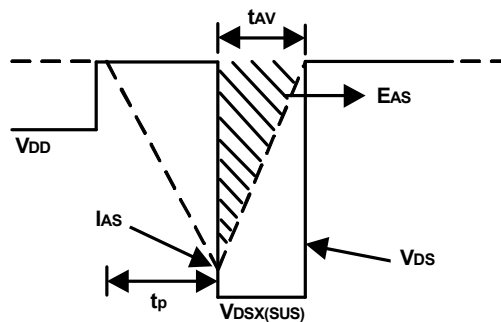
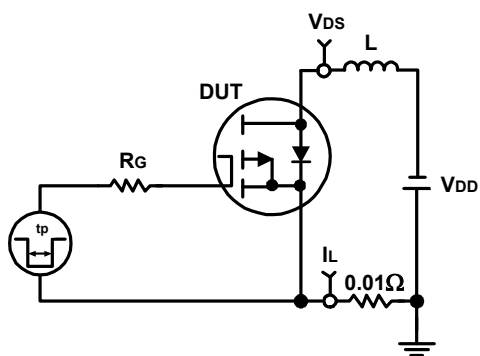
Capacitance



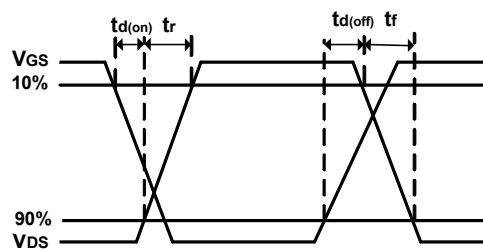
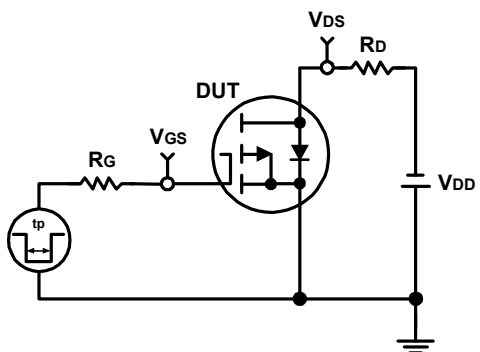
Gate Charge



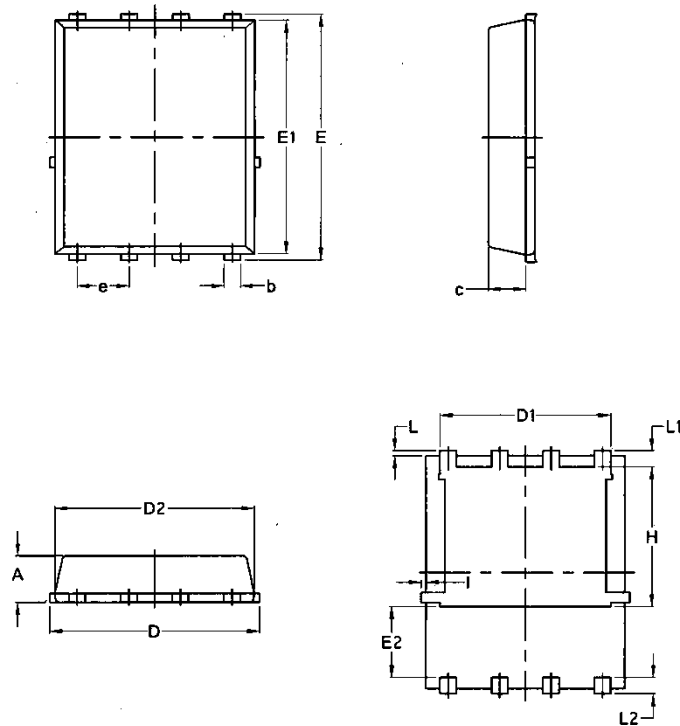
Avalanche Test Circuit and Waveforms



Switching Time Test Circuit and Waveforms



Package Mechanical Data: DFN5x6-8L



Symbol	Common			
	mm		Inch	
	Min	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070