
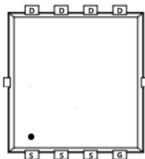
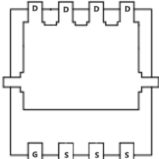
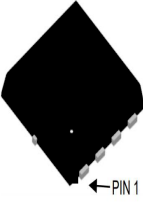
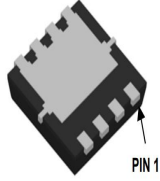
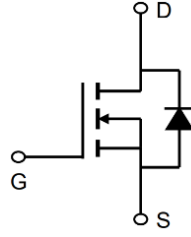


**TM120N03NF**

**N-Channel Enhancement Mosfet**

<p><b>General Description</b></p> <ul style="list-style-type: none"> <li>• Low <math>R_{DS(ON)}</math></li> <li>• RoHS and Halogen-Free Compliant</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Load switch</li> <li>• PWM</li> </ul>	<p><b>General Features</b></p> <p><math>V_{DS} = 30V</math> <math>I_D = 120A</math></p> <p><math>R_{DS(ON)} = 3.0m\Omega(\text{typ.}) @ V_{GS} = 10V</math></p> <p>100% UIS Tested                  100% <math>R_g</math> Tested</p> 
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NF:DFN5x6-8L

Marking: 120N03

**Absolute Maximum Ratings** ( $T_C=25^\circ C$  unless otherwise specified)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	120	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	75	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	350	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	198	mJ
$I_{AS}$	Avalanche Current	53.8	A
$P_D @ T_C=25^\circ C$	Total Power Dissipation <sup>4</sup>	62.5	W
$P_D @ T_A=25^\circ C$	Total Power Dissipation <sup>4</sup>	6	W
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 175	$^\circ C$

**Thermal Data**

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	62	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup> ( $t \leq 10s$ )	---	25	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	2.4	$^\circ C/W$

**TM120N03NF**
**N-Channel Enhancement Mosfet**
**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V T <sub>J</sub> =85°C	-	-	1 30	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1.4	1.7	2.5	V
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
R <sub>DS(ON)</sub> <sup>d</sup>	Drain-Source On-state Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =20A T <sub>J</sub> =125°C	-	3 4.4	3.8 -	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =15A	-	4.0	4.9	
Gfs	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>DS</sub> =10A	-	24.6	-	S
<b>Diode Characteristics</b>						
V <sub>SD</sub> <sup>d</sup>	Diode Forward Voltage	I <sub>SD</sub> =20A, V <sub>GS</sub> =0V	-	0.8	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>DS</sub> =20A, dI <sub>SD</sub> /dt=100A/μs	-	35.6	-	ns
t <sub>a</sub>	Charge Time		-	19.3	-	
t <sub>b</sub>	Discharge Time		-	16.3	-	
Q <sub>rr</sub>	Reverse Recovery Charge		-	26	-	
<b>Dynamic Characteristics<sup>e</sup></b>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	-	1	2	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, Frequency=1.0MHz	-	2485	2971	pF
C <sub>oss</sub>	Output Capacitance		-	850	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	85	-	
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> =15V, R <sub>L</sub> =15Ω, I <sub>DS</sub> =1A, V <sub>GEN</sub> =10V, R <sub>G</sub> =6Ω	-	12.4	23	ns
t <sub>r</sub>	Turn-on Rise Time		-	9.5	18	
t <sub>d(OFF)</sub>	Turn-off Delay Time		-	27.2	49	
t <sub>f</sub>	Turn-off Fall Time		-	35.2	64	
<b>Gate Charge Characteristics<sup>e</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, V <sub>GS</sub> =10V, I <sub>DS</sub> =20A	-	20.6	28.8	nC
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>DS</sub> =20A	-	9.8	-	
Q <sub>gth</sub>	Threshold Gate Charge		-	1.8	-	
Q <sub>gs</sub>	Gate-Source Charge		-	3.8	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	3.7	-	

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

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

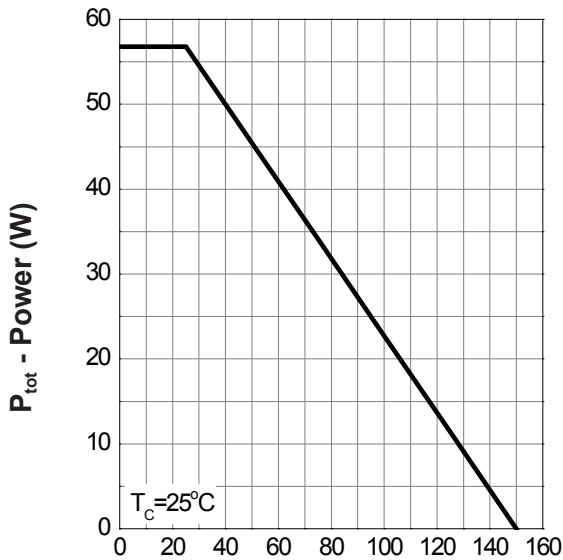


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N-Channel Enhancement Mosfet

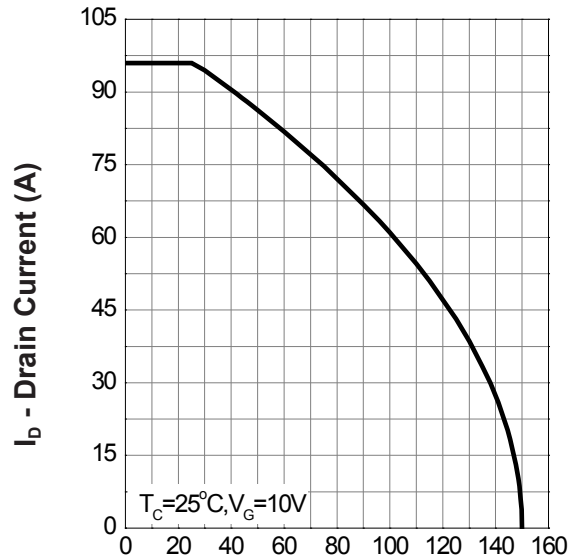
Typical Operating Characteristics

Power Dissipation



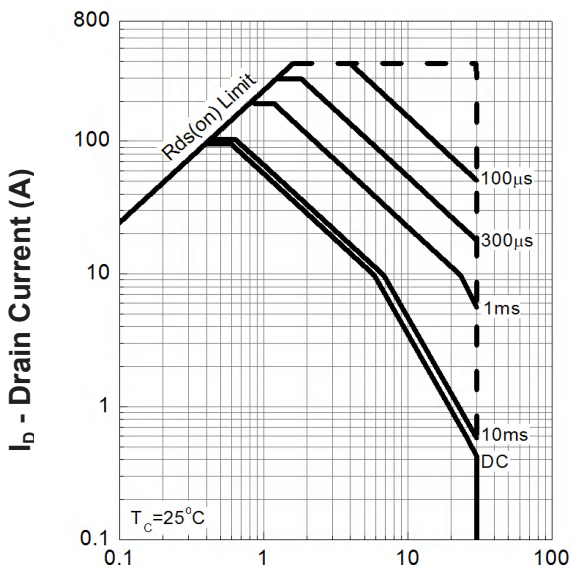
$T_j$  - Junction Temperature (°C)

Drain Current



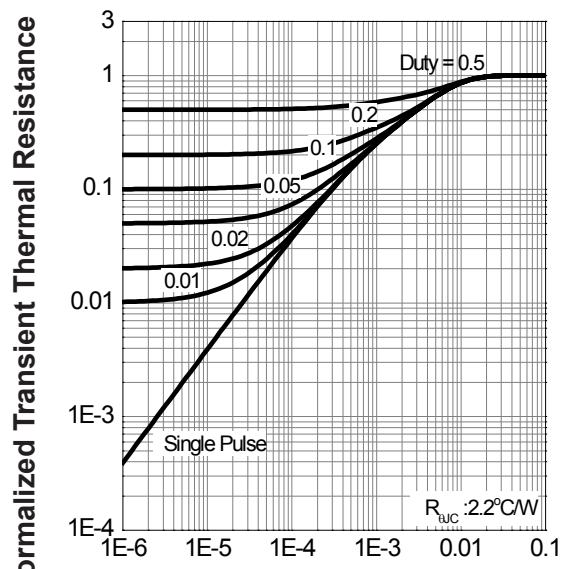
$T_j$  - Junction Temperature (°C)

Safe Operation Area



$V_{DS}$  - Drain - Source Voltage (V)

Thermal Transient Impedance



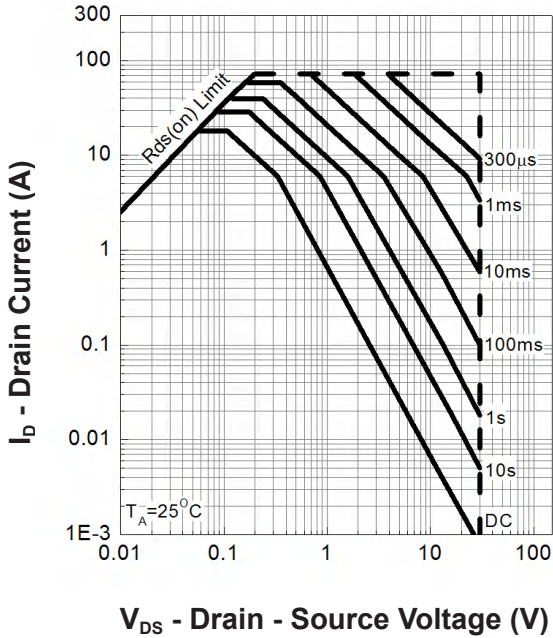
Square Wave Pulse Duration (sec)



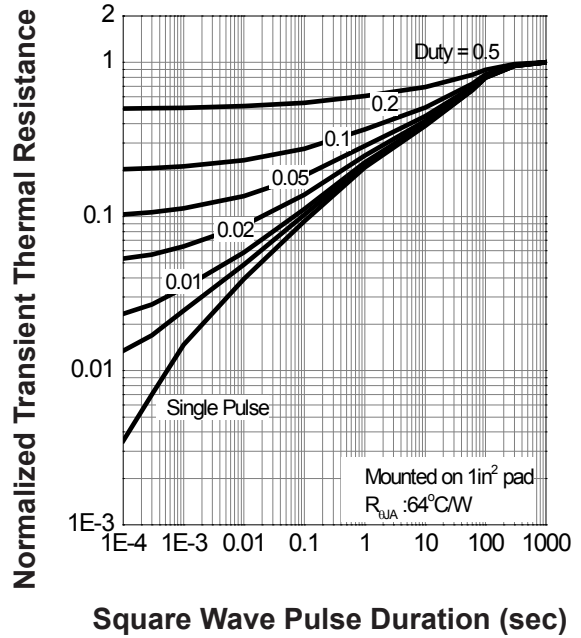
TM120N03NF

N-Channel Enhancement Mosfet

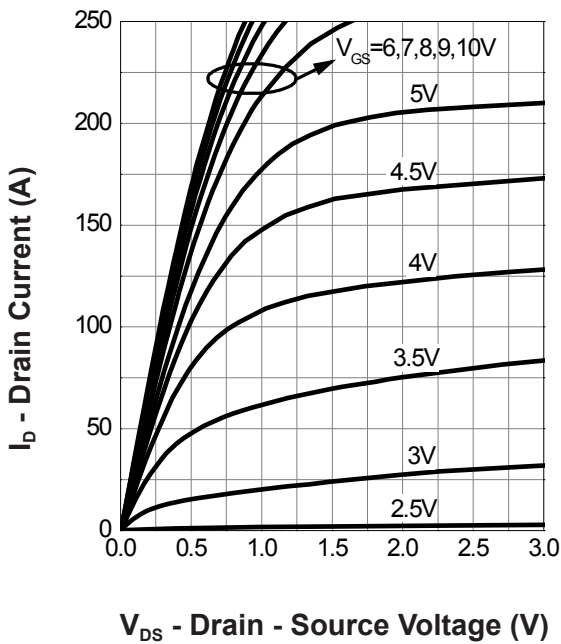
Safe Operation Area



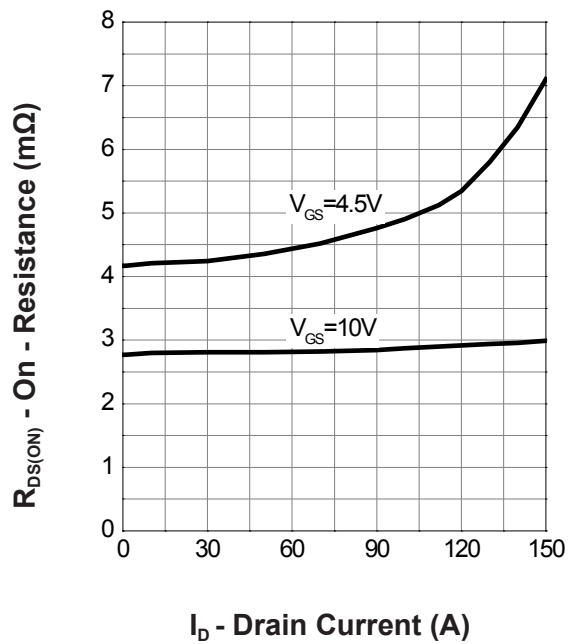
Thermal Transient Impedance



Output Characteristics



Drain-Source On Resistance

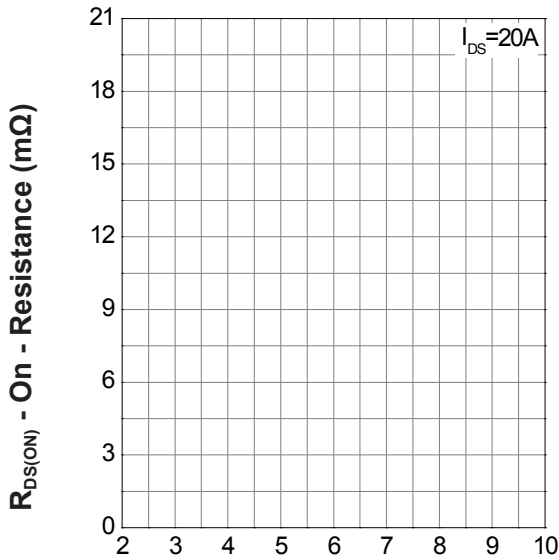




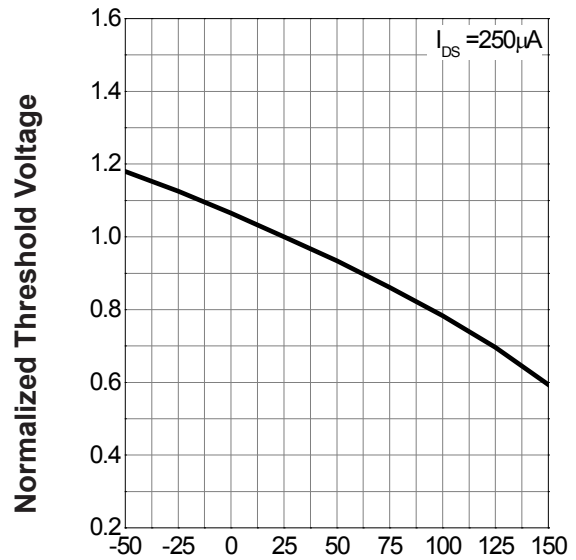
TM120N03NF

N-Channel Enhancement Mosfet

Gate-Source On Resistance



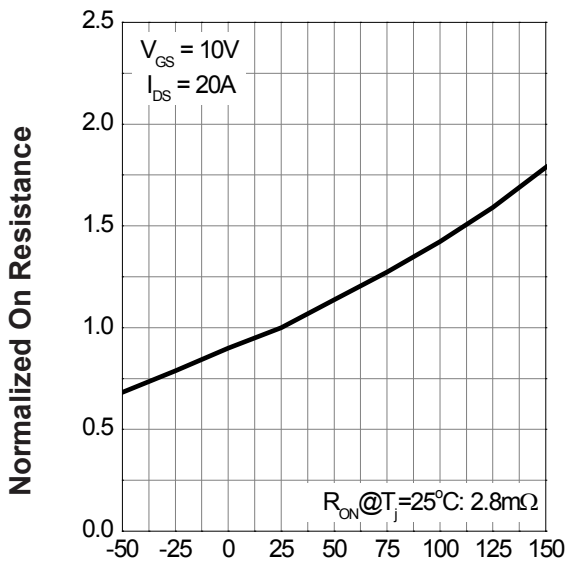
Gate Threshold Voltage



V<sub>GS</sub> - Gate - Source Voltage (V)

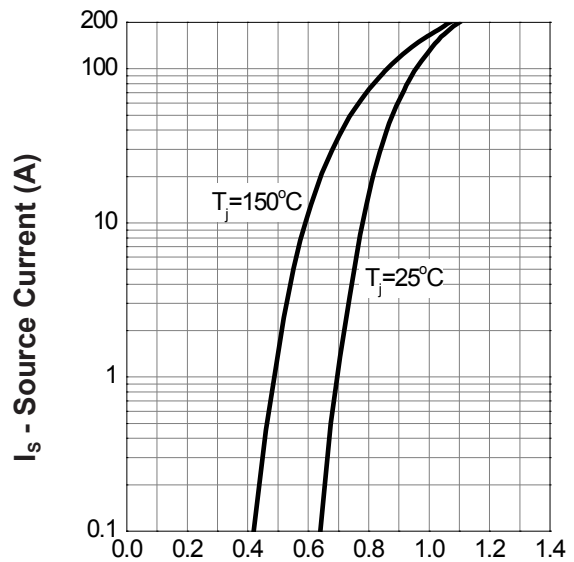
T<sub>J</sub> - Junction Temperature (°C)

Drain-Source On Resistance



T<sub>J</sub> - Junction Temperature (°C)

Source-Drain Diode Forward



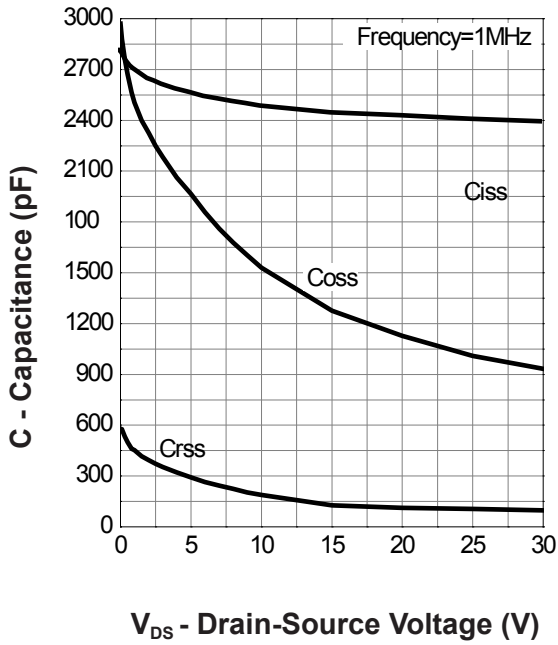
V<sub>SD</sub> - Source - Drain Voltage (V)



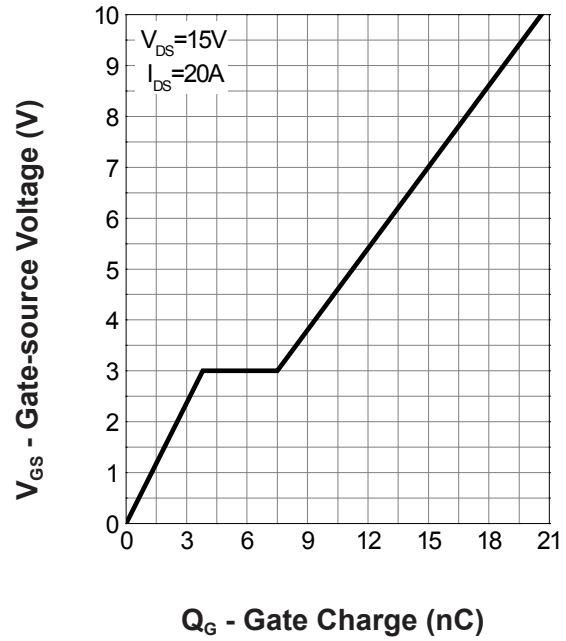
# TM120N03NF

## N-Channel Enhancement Mosfet

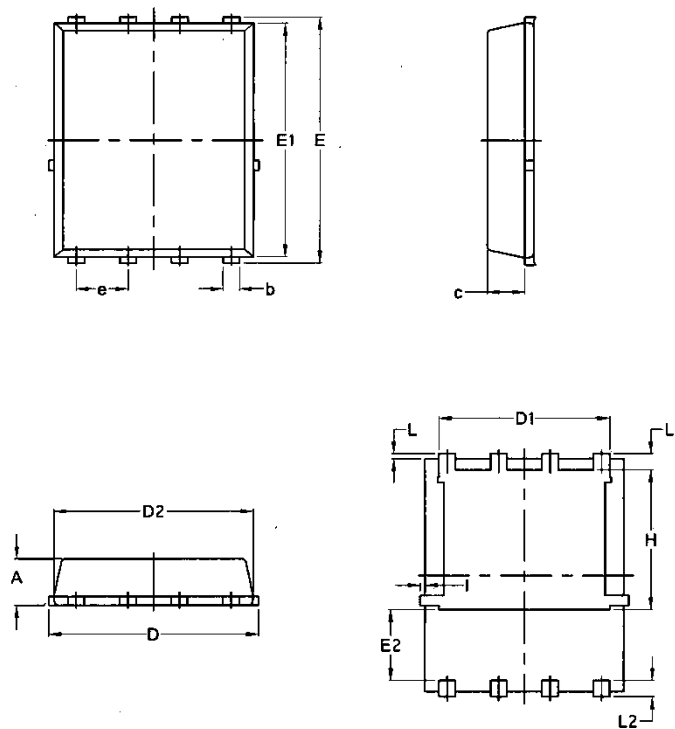
### Capacitance



### Gate Charge



## 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