
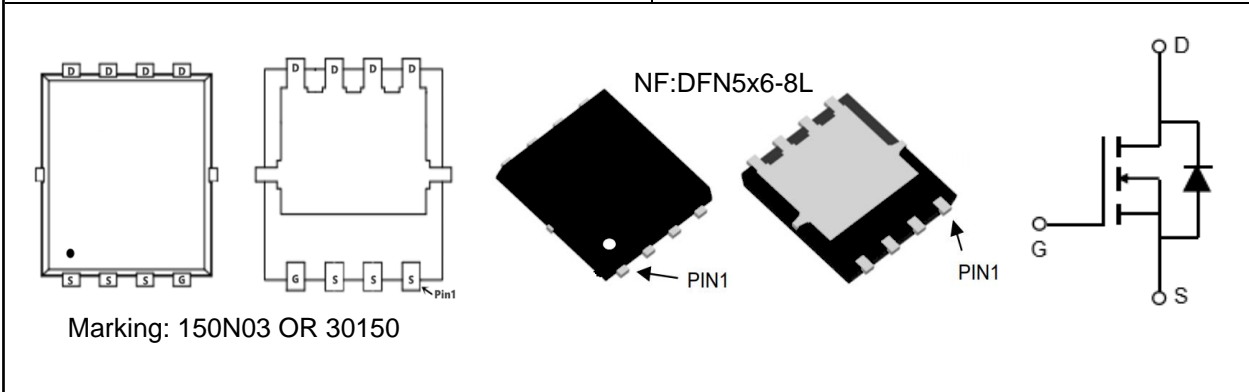


TM150N03NF

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 = 150A</math>  <math>R_{DS(ON)} = 1.8m\Omega @ V_{GS}=10V</math></p> <p>100% UIS Tested              100% <math>R_g</math> Tested</p> 
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**Absolute Maximum Ratings** ( $T_A = 25^\circ C$  Unless Otherwise Noted)

Symbol	Parameter	Rating	Unit	
<b>Common Ratings</b>				
$V_{DSS}$	Drain-Source Voltage	30	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 20$		
$T_J$	Maximum Junction Temperature	150	$^\circ C$	
$T_{STG}$	Storage Temperature Range	-55 to 150		
$I_S$	Diode Continuous Forward Current	$T_C=25^\circ C$	42.5	A
$I_D^a$	Continuous Drain Current	$T_C=25^\circ C$	150	
		$T_C=100^\circ C$	75	
$I_{DM}^b$	Pulsed Drain Current	$T_C=25^\circ C$	160	
$P_D$	Maximum Power Dissipation	$T_C=25^\circ C$	78	W
		$T_C=100^\circ C$	31	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	1.6	$^\circ C/W$
$I_D^c$	Continuous Drain Current	$T_A=25^\circ C$	28	A
		$T_A=70^\circ C$	22	
$P_D^c$	Maximum Power Dissipation	$T_A=25^\circ C$	2.3	W
		$T_A=70^\circ C$	1.5	
$R_{\theta JA}^c$	Thermal Resistance-Junction to Ambient	$t \leq 10s$	20	$^\circ C/W$
		Steady State	55	
$I_{AS}^d$	Avalanche Current, Single pulse	$L=0.1mH$	86	A
$E_{AS}^d$	Avalanche Energy, Single pulse	$L=0.1mH$	372	mJ

Note a,\* : Max. continue current is limited by bonding wire.  
 Note b : Pulse width is limited by max. junction temperature.  
 Note c :  $R_{\theta JA}$  steady state  $t=999s$ .  
 Note d : UIS tested and pulse width limited by maximum junction temperature  $150^\circ C$  (initial temperature  $T_J=25^\circ C$ ).

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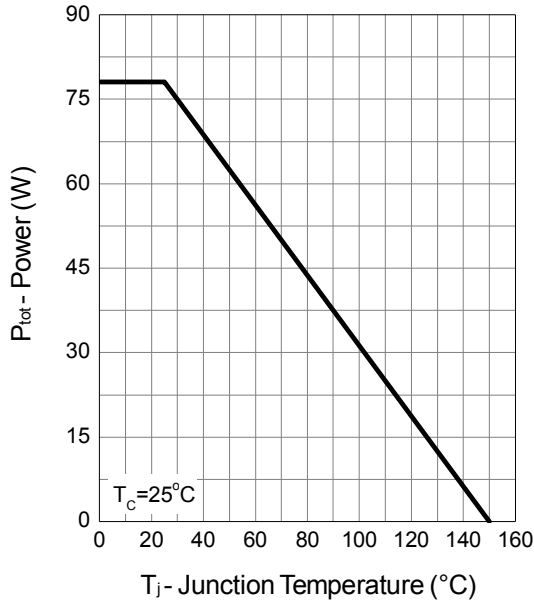
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	30	-	-	V
$BV_{DSS(t)}$	Drain-Source Breakdown Voltage (transient)	$V_{GS}=0V, I_{D(av)}=40A$ $T_{case}=25^\circ\text{C}, t_{transient}=100ns$	34	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24V, V_{GS}=0V$	-	-	1	$\mu A$
		$T_J=85^\circ\text{C}$	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.3	1.6	2.3	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
$R_{DS(ON)}^e$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=20A$	-	1.8	2.3	m $\Omega$
		$T_J=125^\circ\text{C}$	-	2.2	-	
		$V_{GS}=4.5V, I_{DS}=12A$	-	2.2	3	
Gfs	Forward Transconductance	$V_{DS}=5V, I_{DS}=15A$	-	32	-	S
<b>Diode Characteristics</b>						
$V_{SD}^e$	Diode Forward Voltage	$I_{SD}=20A, V_{GS}=0V$	-	0.8	1.1	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=20A, dI_{SD}/dt=100A/\mu s$	-	50	-	ns
$t_a$	Charge Time		-	23.5	-	
$t_b$	Discharge Time		-	27.5	-	
$Q_{rr}$	Reverse Recovery Charge		-	45	-	
<b>Dynamic Characteristics</b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	-	0.9	2	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V,$ $V_{DS}=25V,$ Frequency=1.0MHz	-	2780		pF
$C_{oss}$	Output Capacitance		-	590		
$C_{riss}$	Reverse Transfer Capacitance		-	130		
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=15V, R_L=15\Omega,$ $I_{DS}=1A, V_{GEN}=10V,$ $R_G=6\Omega$	-	15.5	-	ns
$t_r$	Turn-on Rise Time		-	11	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	35	-	
$t_f$	Turn-off Fall Time		-	40	-	
<b>Gate Charge Characteristics</b>						
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=10V,$ $I_{DS}=20A$	-	44.5	57.8	nC
$Q_g$	Total Gate Charge	$V_{DS}=15V, V_{GS}=4.5V,$ $I_{DS}=20A$	-	21.2	-	
$Q_{gth}$	Threshold Gate Charge		-	2.9	-	
$Q_{gs}$	Gate-Source Charge		-	4.3	-	
$Q_{gd}$	Gate-Drain Charge		-	8.3	-	

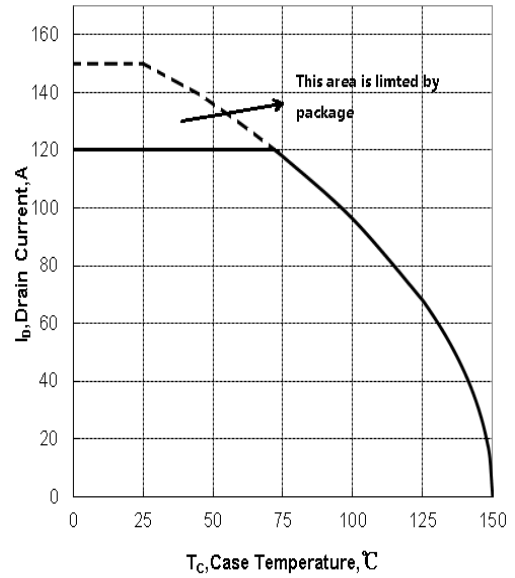
Note e : Pulse test ; pulse width $\leq 300\mu s$ , duty cycle $\leq 2\%$ .

## Typical Operating Characteristics

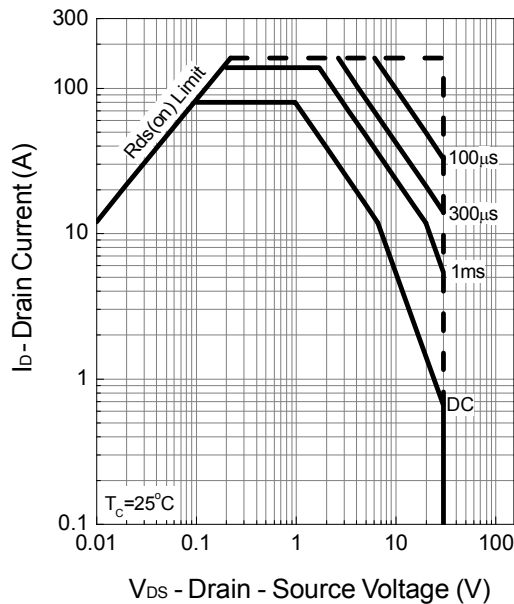
Power Dissipation



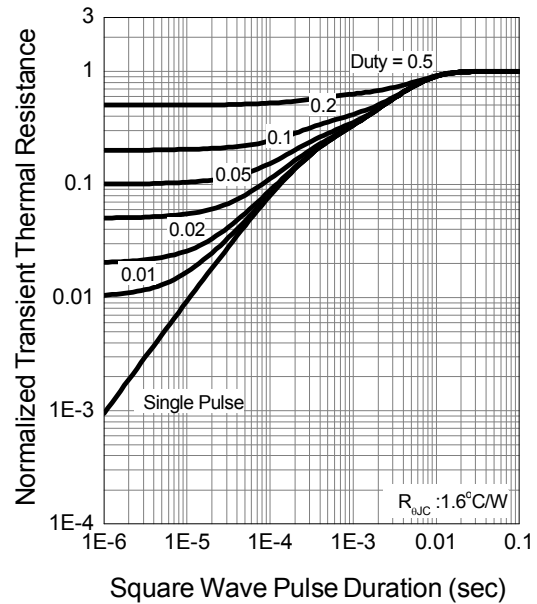
Drain Current



Safe Operation Area

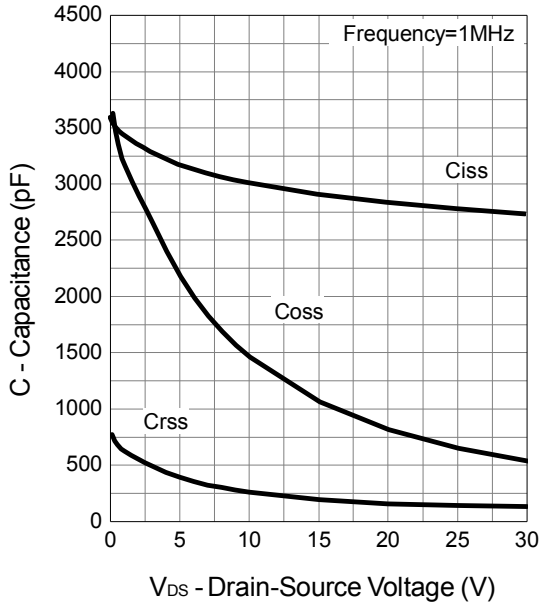


Thermal Transient Impedance

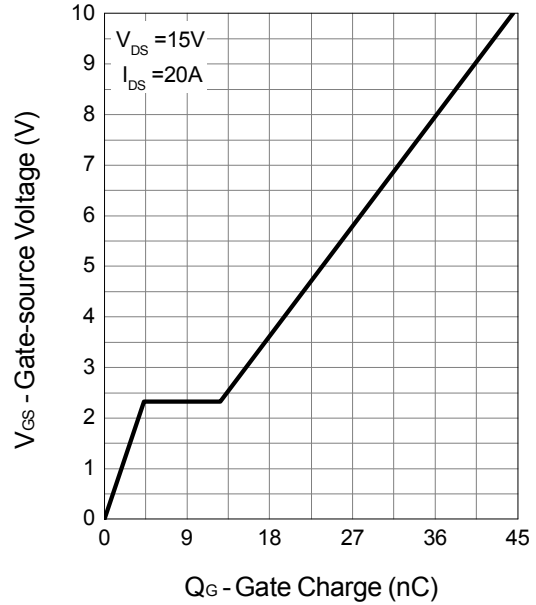


Typical Operating Characteristics (Cont.)

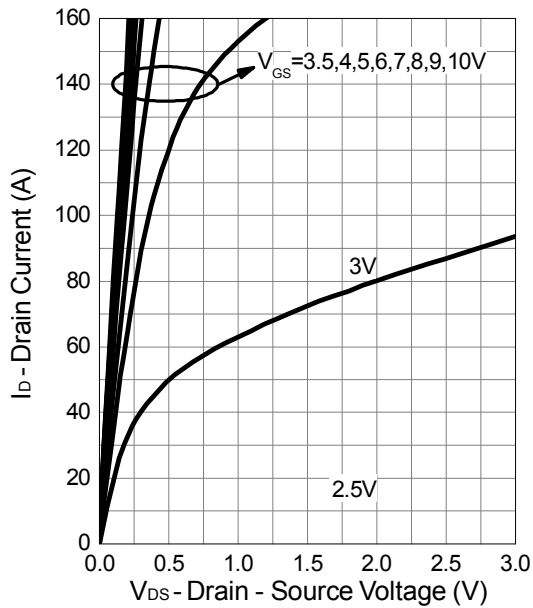
Capacitance



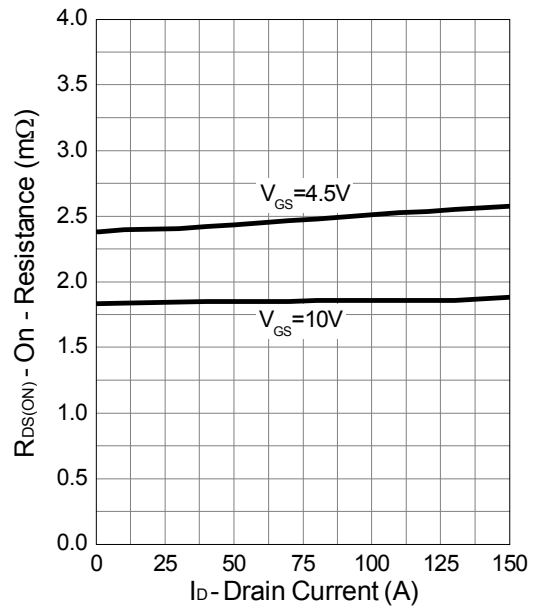
Gate Charge



Output Characteristics

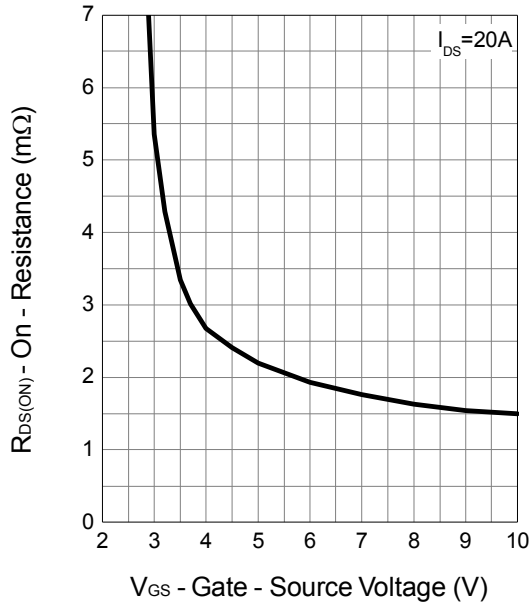


Drain-Source On Resistance

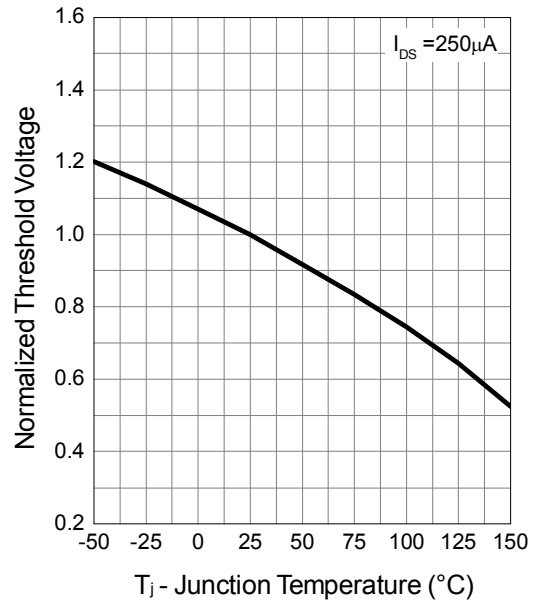


### Typical Operating Characteristics (Cont.)

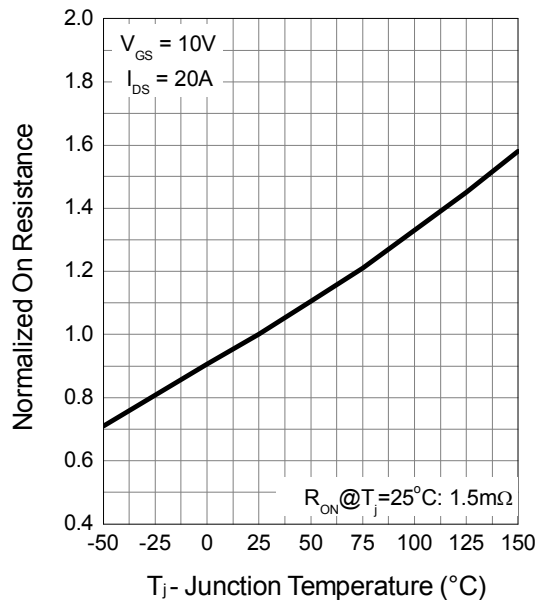
Gate-Source On Resistance



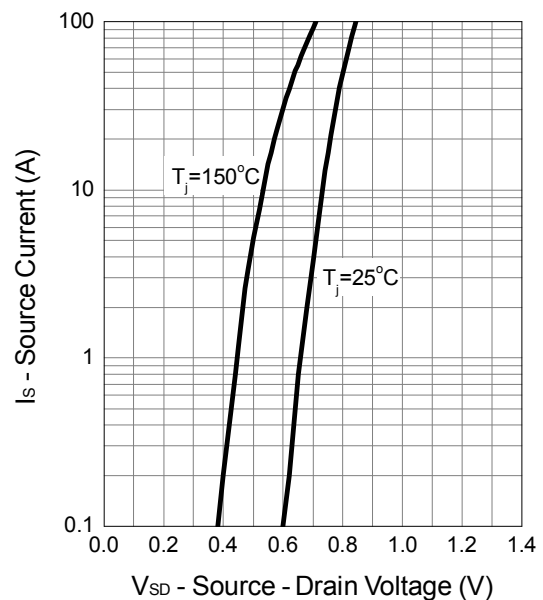
Gate Threshold Voltage



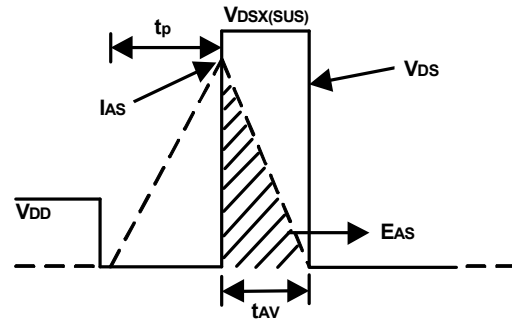
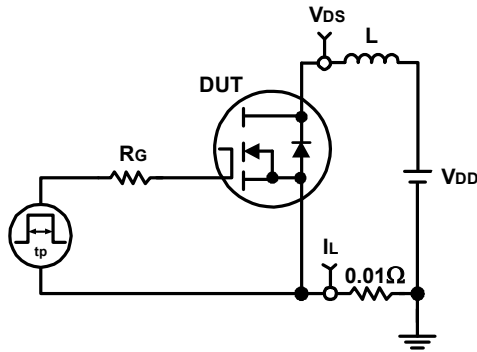
Drain-Source On Resistance



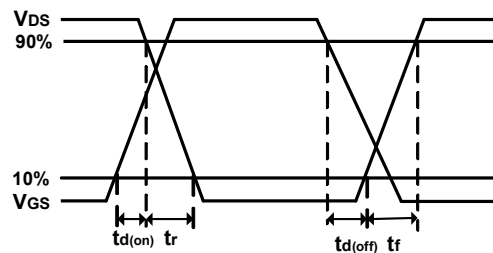
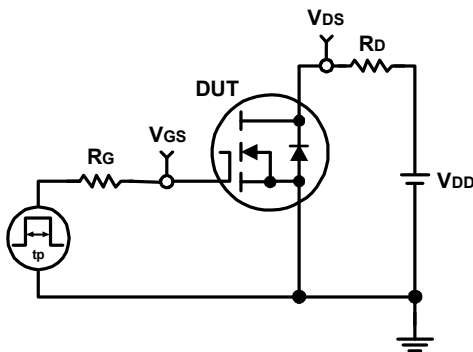
Source-Drain Diode Forward



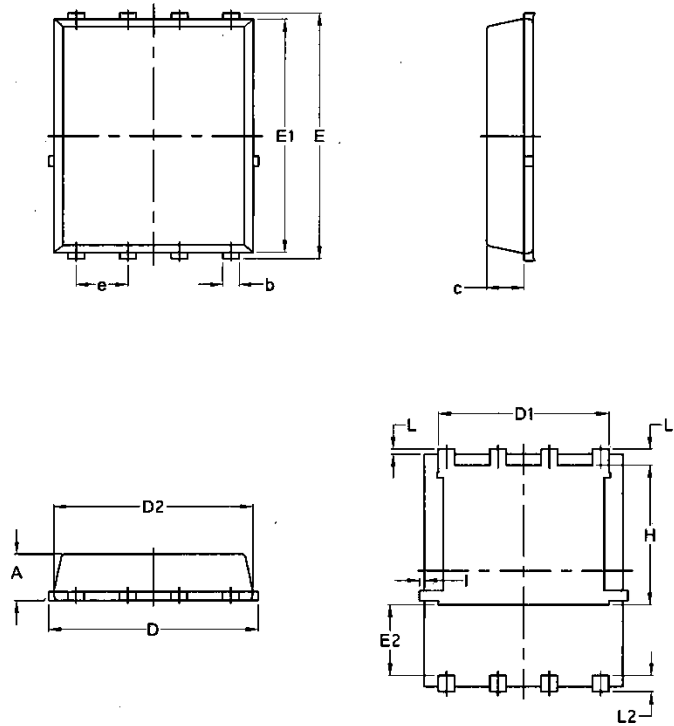
### Avalanche Test Circuit and Waveforms



### 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