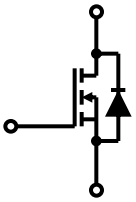
TMP3N90/TMPF3N90
TMP3N90G/TMPF3N90G

Features

- Low gate charge
- 100% avalanche tested
- Improved dv/dt capability
- RoHS compliant
- Halogen free package
- JEDEC Qualification

V_{DSS} = 990 V @T_{jmax}
I_D = 2.5A
$R_{DS(ON)}$ = 5.1 Ω(max) @ V_{GS}= 10 V



Absolute Maximum Ratings

Parameter		Symbol	TMP3N90(G)	TMPF3N90(G)	Unit
Drain-Source Voltage		V_{DSS}	900		V
Gate-Source Voltage		V_{GS}	±30		V
Continuous Drain Current	T_C = 25 ℃	I_D	2.5	2.5 *	A
	T_C = 100 ℃		1.6	1.6 *	A
Pulsed Drain Current (Note 1)		I_{DM}	10	10*	A
Single Pulse Avalanche Energy (Note 2)		E_{AS}	16.6		mJ
Repetitive Avalanche Current (Note 1)		I_{AR}	2.5		A
Repetitive Avalanche Energy (Note 1)		E_{AR}	9.4		mJ
Power Dissipation	T_C = 25 ℃	P_D	94	32	W
	Derate above 25 ℃		0.75	0.25	W/℃
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5		V/ns
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~150		℃
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300		℃

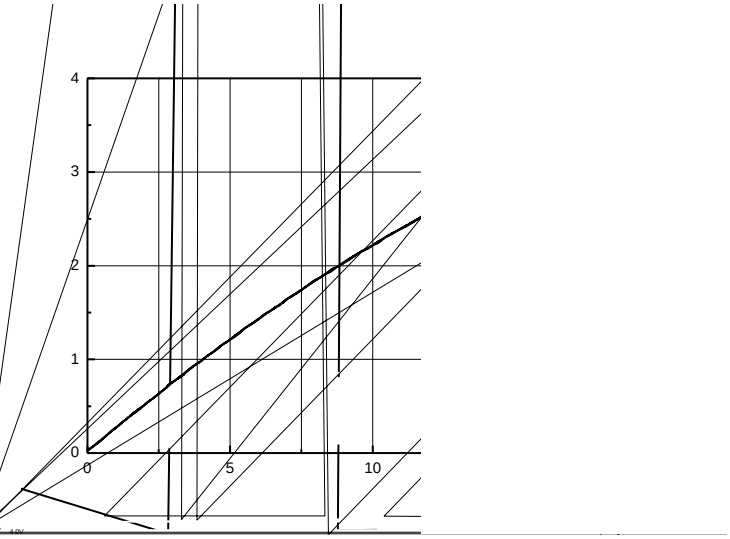
Thermal Characteristics

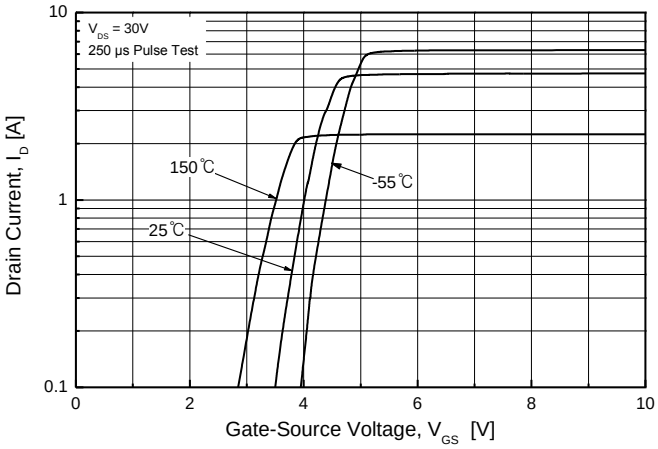
Parameter	Symbol	TMP3N90(G)	TMPF3N90(G)	Unit
Maximum Thermal resistance, Junction-to-Case	$R_{\theta JC}$	1.33	3.9	℃/W
Maximum Thermal resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	62.5	℃/W

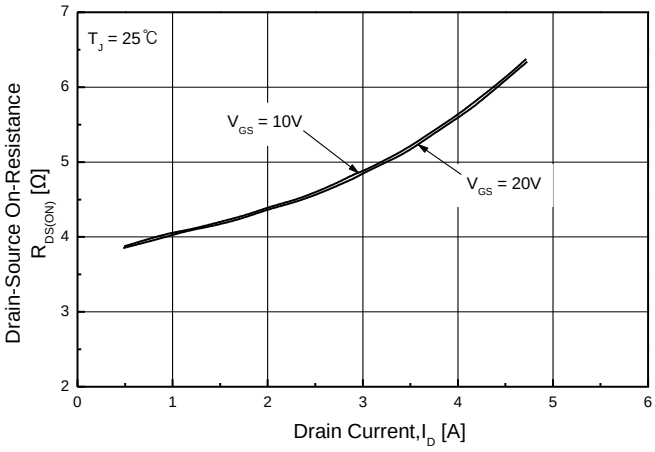
Electrical Characteristics : T_C=25℃, unless otherwise noted

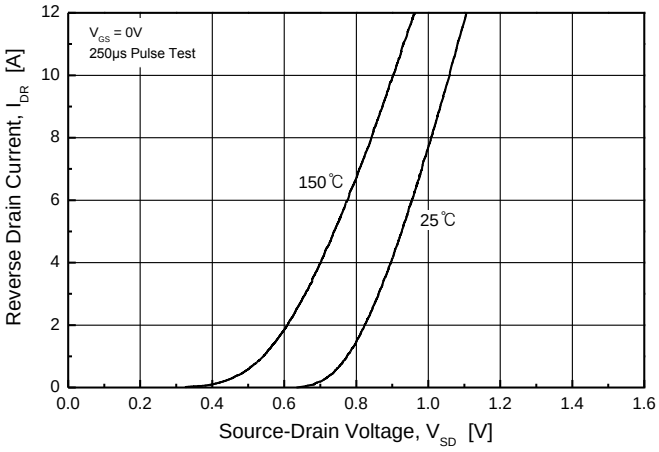
Parameter	Symbol	Test condition	Min	Typ	Max	Units
OFF						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0 V, I_D = 250 µA	900	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 900 V, V_{GS} = 0 V	--	--	10	µA
		V_{DS} = 720 V, T_C = 125°C	--	--	100	µA
Forward Gate-Source Leakage Current	I_{GSSF}	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
Reverse Gate-Source Leakage Current	I_{GSSR}	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
ON						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	2	--	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 1.25 A	--	4.3	5.1	Ω
Forward Transconductance (Note 4)	g_{FS}	V_{DS} = 30 V, I_D = 1.25 A	--	3	--	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	748	--	pF
Output Capacitance	C_{oss}		--	55	--	pF
Reverse Transfer Capacitance	C_{rss}		--	8.7	--	pF
SWITCHING						
Turn-On Delay Time (Note 4,5)	$t_{d(on)}$	V_{DD} = 450 V, I_D = 2.5 A, R_G = 25 Ω	--	16	--	ns
Turn-On Rise Time (Note 4,5)	t_r		--	25	--	ns
Turn-Off Delay Time (Note 4,5)	$t_{d(off)}$		--	63	--	ns
Turn-Off Fall Time (Note 4,5)	t_f		--	31	--	ns
Total Gate Charge (Note 4,5)	Q_g	V_{DS} = 720V, I_D = 2.5 A, V_{GS} = 10 V	--	17	--	nC
Gate-Source Charge (Note 4,5)	Q_{gs}		--	2.4	--	nC
Gate-Drain Charge (Note 4,5)	Q_{gd}		--	6.6	--	nC
SOURCE DRAIN DIODE						
Maximum Continuous Drain-Source Diode Forward Current	I_S	---	--	--	2.5	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}	---	--	--	10	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_S = 2.5 A	--	--	1.5	V
Reverse Recovery Time (Note 4)	t_{rr}	V_{GS} = 0 V, I_S = 2.5 A, dI_F / dt = 100 A/µs	--	355	--	ns
Reverse Recovery Charge (Note 4)	Q_{rr}		--	1.8	--	µC

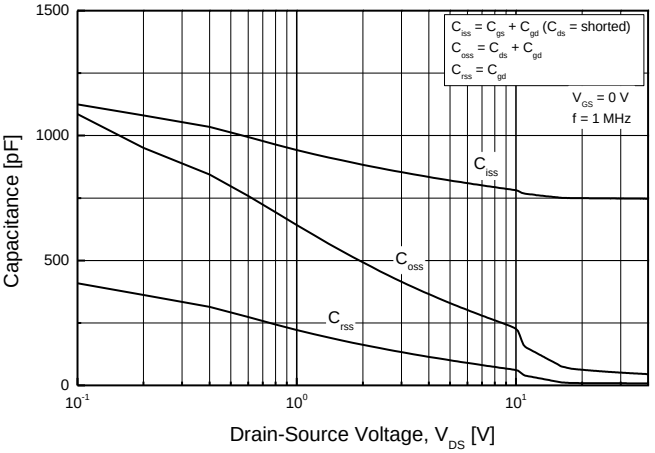
Note :
1. Repeated rating : Pulse width limited by safe operating area
2. L= 5.0mH, I_{AS} = 2.5A, V_{DD} = 50V, R_G = 25Ω, Starting T_J= 25 ℃
3 I_{SD} ≤ 2.5A, di/dt ≤ 200A/µs , V_{DD} ≤ BV_{DS}, Starting T_J= 25 ℃
4. Pulse Test :Pulse width ≤ 300µs, Duty Cycle ≤ 2%
5. Essentially Independent of Operating Temperature Typical Characteristics

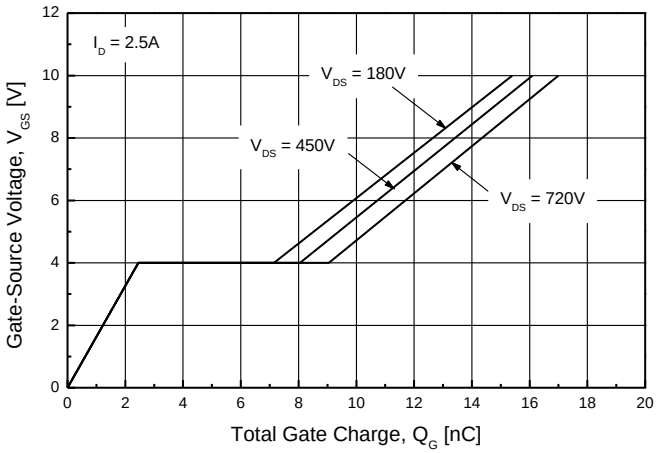

4
3
2
1
0
0
5
10

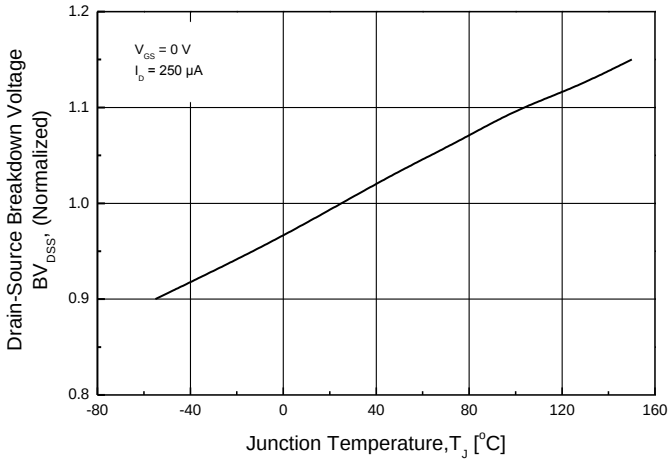

V_{DS} = 30V
250 μs Pulse Test
150℃
-55℃
25℃
Drain Current, I_D [A]
Gate-Source Voltage, V_{GS} [V]
10
1
0.1
0
2
4
6
8
10

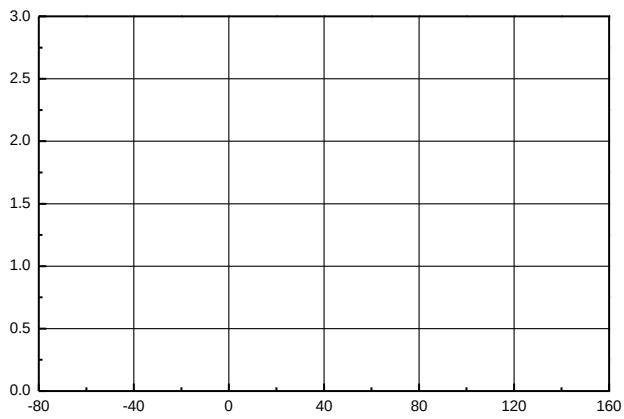

T_J = 25℃
V_{GS} = 10V
V_{GS} = 20V
Drain-Source On-Resistance
$R_{DS(ON)}$ [Ω]
Drain Current,I_D [A]
7
6
5
4
3
2
0
1
2
3
4
5
6

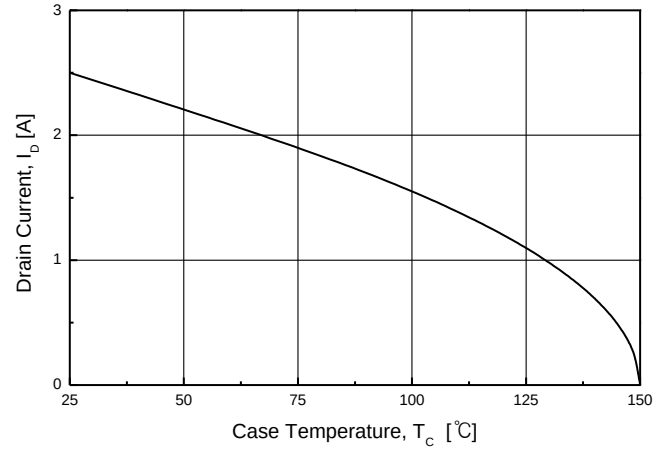

V_{GS} = 0V
250μs Pulse Test
150℃
25℃
Reverse Drain Current, I_{DR} [A]
Source-Drain Voltage, V_{SD} [V]
12
10
8
6
4
2
0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6

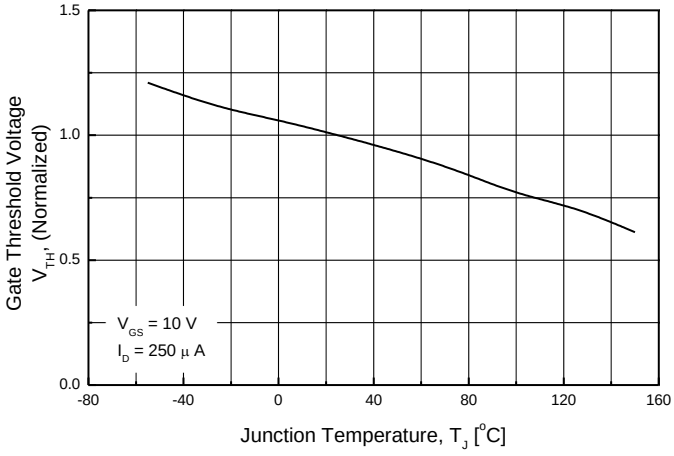

C_{iss} = C_{gs} + C_{gd} (C_{ds} = shorted)
C_{oss} = C_{ds} + C_{gd}
C_{rss} = C_{gd}
V_{GS} = 0 V
f = 1 MHz
C_{iss}
C_{oss}
C_{rss}
Capacitance [pF]
Drain-Source Voltage, V_{DS} [V]
1500
1000
500
0
10^{-1}
10^{0}
10^{1}


I_D = 2.5A
V_{DS} = 180V
V_{DS} = 450V
V_{DS} = 720V
Gate-Source Voltage, V_{GS} [V]
Total Gate Charge, Q_G [nC]
12
10
8
6
4
2
0
0
2
4
6
8
10
12
14
16
18
20

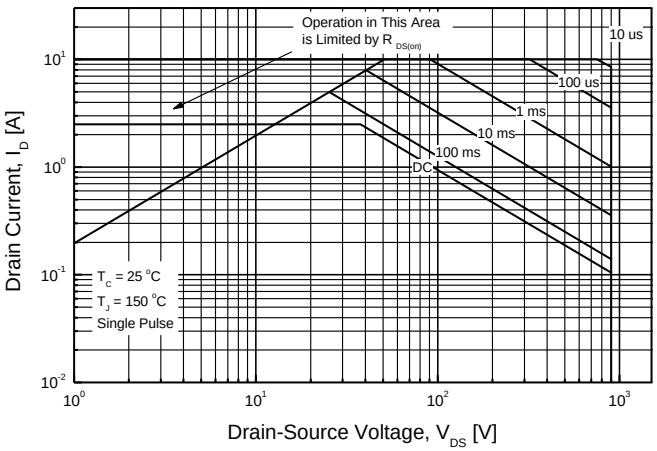








TMP3N90(G)



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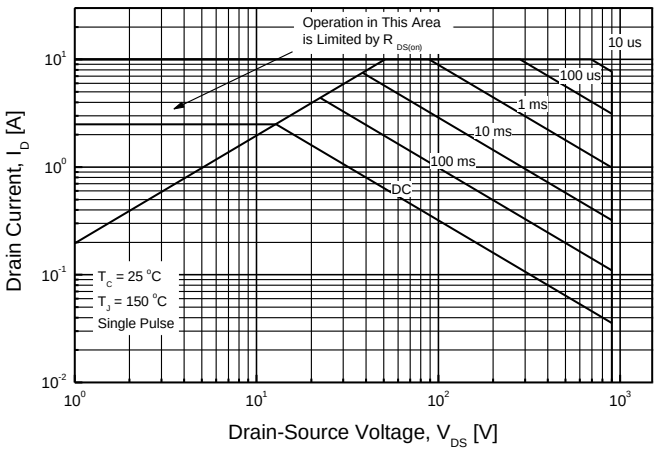

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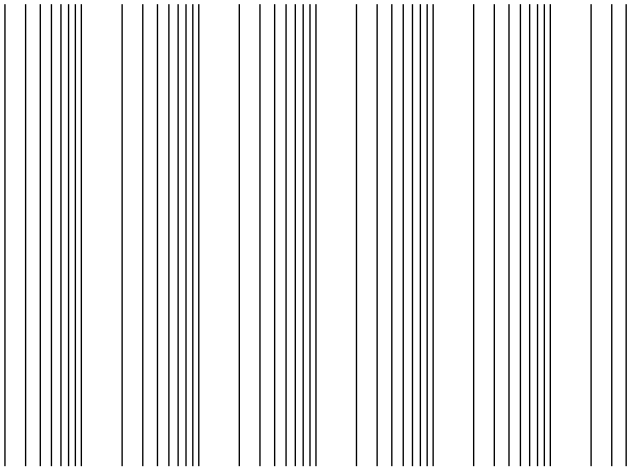

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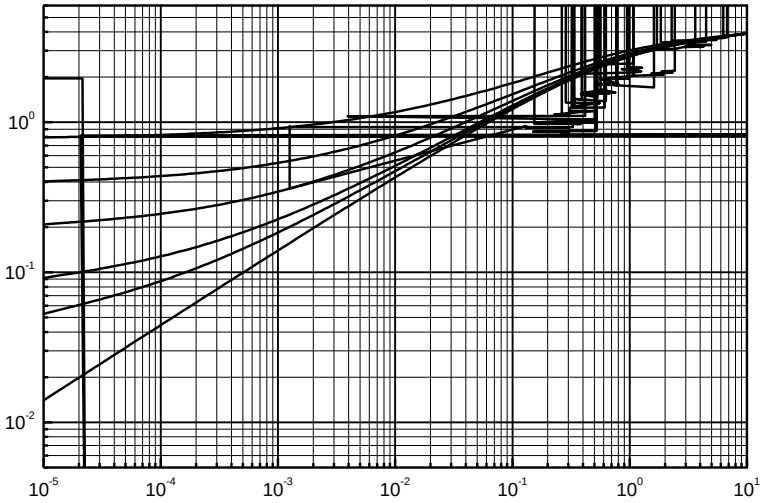
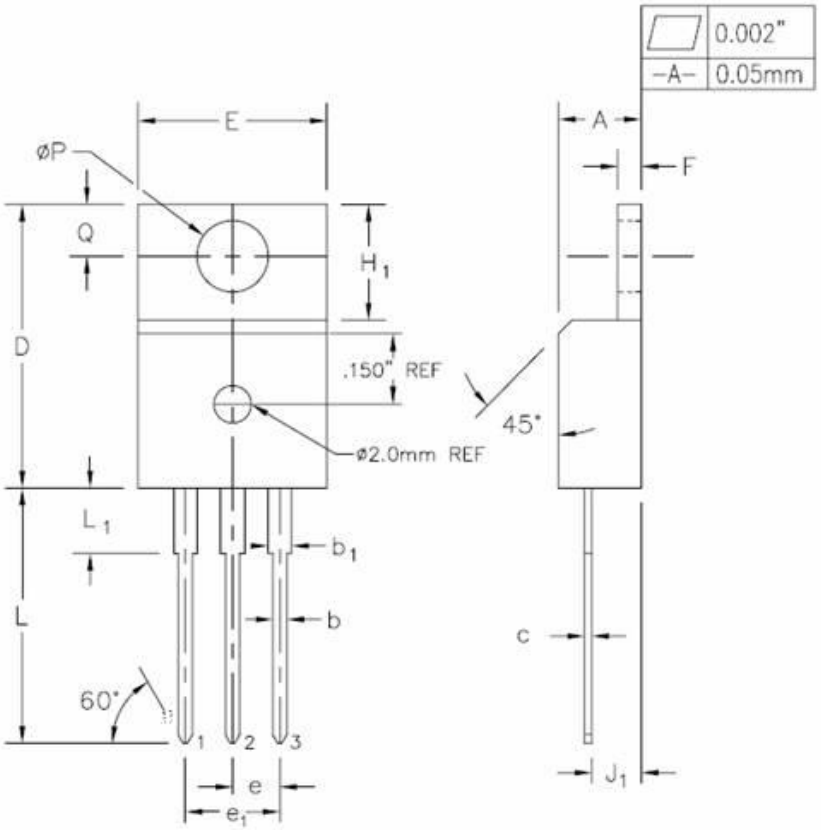
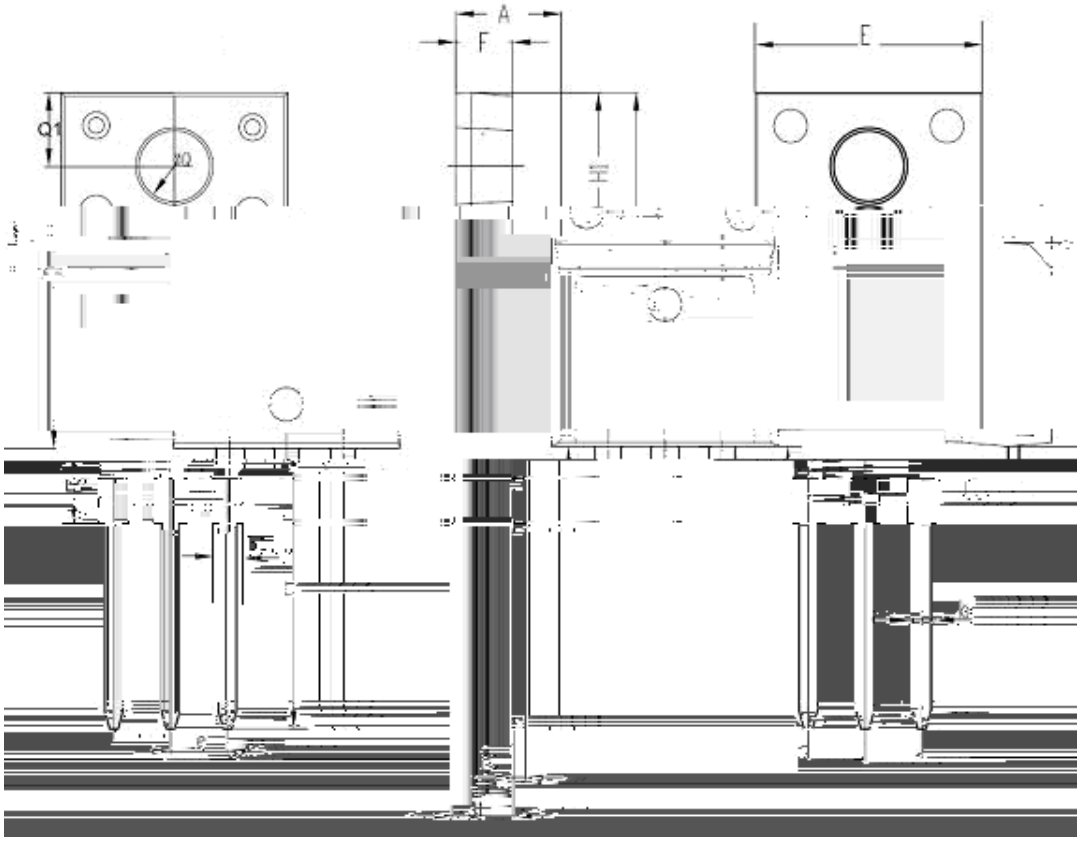


TO-220AB-3L MECHANICAL DATA



SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	0.170	0.180	4.32	4.57	
b	0.028	0.036	0.71	0.91	
b_1	0.045	0.055	1.15	1.39	
c	0.014	0.021	0.36	0.53	
D	0.590	0.610	14.99	15.49	
E	0.395	0.415	10.04	10.54	
e	0.100 TYP.		2.54 TYP.		
e_1	0.200 BSC		5.08 BSC		
F	0.048	0.054	1.22	1.37	
H_1	0.235	0.255	5.97	6.47	
J_1	0.100	0.110	2.54	2.79	
L	0.530	0.550	13.47	13.97	
L_1	0.130	0.150	3.31	3.81	2
øP	0.140	0.153	3.56	3.88	
Q	0.102	0.112	2.60	2.84	

TO-220F-3L MECHANICAL DATA



NC M!	JODI F !		NJMMJNF F !!		O F !
	NJO!	NB !	NJO!	NB !	
B!	1 289!!	1 2 5!!	5 64!!	5 4!!	!
!	1 139!!	1 147!!	1 82!!	1 2!!	!
D!	1 129!	1 135!	1 56!	1 71!	!
E!	1 728!!	1 744!!	26 78!!	27 18!!	!
F!	1 4 3!!	1 519!!	7!!	21 47!!	!
!	1 211! !		3 65 !		!
I 2!	1 367!!	1 383!!	7 61!!	7 1!!	!
2!	1 21 2!!	1 228!!	3 67!!	3 7!!	!
M!	1 614!!	1 62 !!	23 89!!	24 29!!	!
φQ!	1 228!!	1 244!!	3 9!!	4 49!!	!
2!	1 156!!	1 166!!	2 26!!	2 4 !!	!
M2!	1 225!	1 241!!	3 !!	4 4!!	!
2!	1 233!!	1 249!!	4 21!!	4 61!!	!
!	1 1 3!	1 219!	3 45!	3 85!	