IXYS

Advance Technical Information

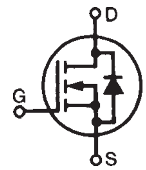
Polar™ HiperFET™ Power MOSFET

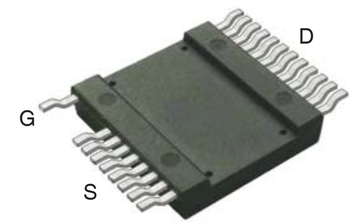
MMIX1F40N110P

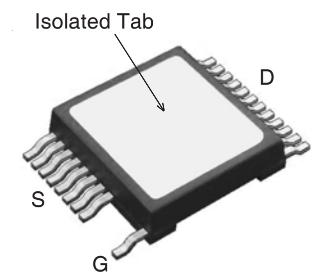
V_{DSS} = 1100V
I_{D25} = 24A
$R_{DS(on)}$ ≤ 290mΩ
t_{rr} ≤ 300ns

(Electrically Isolated Tab)

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Rectifier







G = Gate D = Drain
S = Source

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	1100	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	1100	V
V_{GSS}	Continuous	±30	V
V_{GSM}	Transient	±40	V
I_{D25}	T_C = 25°C	24	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}	100	A
I_A	T_C = 25°C	20	A
E_{AS}	T_C = 25°C	2	J
dv/dt	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq$ 150°C	15	V/ns
P_D	T_C = 25°C	500	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6mm (0.062 in.) from Case for 10s	300	°C
T_{SOLD}	Plastic Body for 10s	260	°C
V_{ISOL}	50/60 Hz, 1 Minute	2500	V~
F_C	Mounting Force	50..200 / 11..45	N/lb.
Weight		8	g

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 3mA	1100			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	3.5		6.5	V
I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V			±200	nA
I_{DSS}	V_{DS} = V_{DSS}, V_{GS} = 0V			50	μA
	T_J = 125°C			3	mA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 20A, Note 1			290	mΩ

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Substrate
  - Excellent Thermal Transfer
  - Increased Temperature and Power Cycling Capability
  - High Isolation Voltage (2500V~)
- Low Intrinsic Gate Resistance
- Low Package Inductance
- Fast Intrinsic Rectifier
- Low $R_{DS(on)}$ and Q_G

Advantages

- High Power Density
- Easy to Mount
- Space Savings

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Pulse Power Applications
- Discharge Circuits in Lasers Pulsers, Spark Igniters, RF Generators
- DC-DC converters
- DC-AC inverters

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	V_{DS} = 20V, I_D = 20A, Note 1	20	32		S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		19		nF
C_{oss}			1070		pF
C_{rss}			46		pF
R_{Gi}	Gate Input Resistance		1.65		Ω
$t_{d(on)}$	**Resistive Switching Times** V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 20A, R_G = 1Ω (External)		53		ns
t_r			55		ns
$t_{d(off)}$			110		ns
t_f			54		ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 20A		310		nC
Q_{gs}			95		nC
Q_{gd}			142		nC
R_{thJC}				0.25	°C/W
R_{thCS}			0.05		°C/W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0V			40	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			160	A
V_{SD}	$I_F = I_S$, V_{GS} = 0V, Note 1			1.5	V
t_{rr}	I_F = 20A, -di/dt = 100A/µs, V_R = 100V, V_{GS} = 0V			300	ns
Q_{RM}			2.2		µC
I_{RM}			16.0		A

Note 1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

Fig. 1. Output Characteristics @ T_J = 25ºC

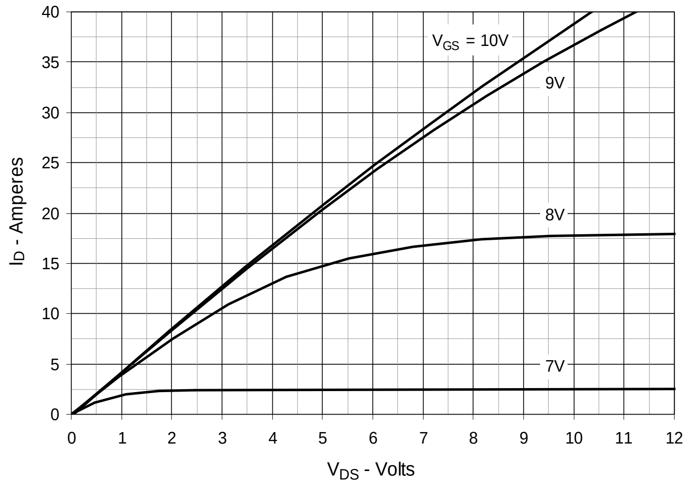


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

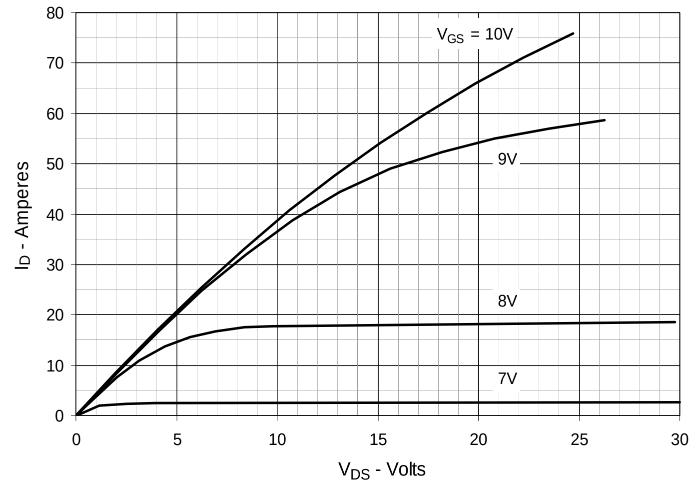


Fig. 3. Output Characteristics @ T_J = 125ºC

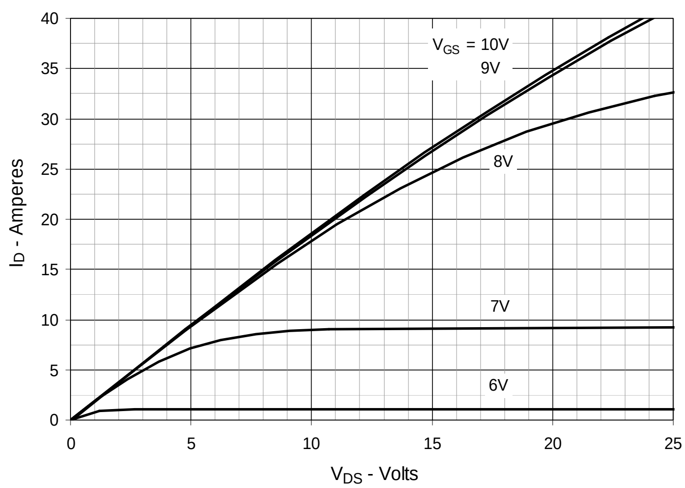


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 20A Value vs. Junction Temperature

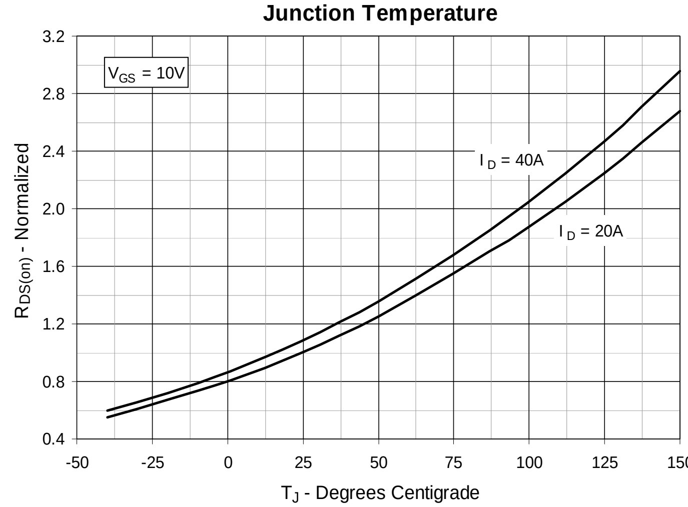


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 20A Value vs. Drain Current

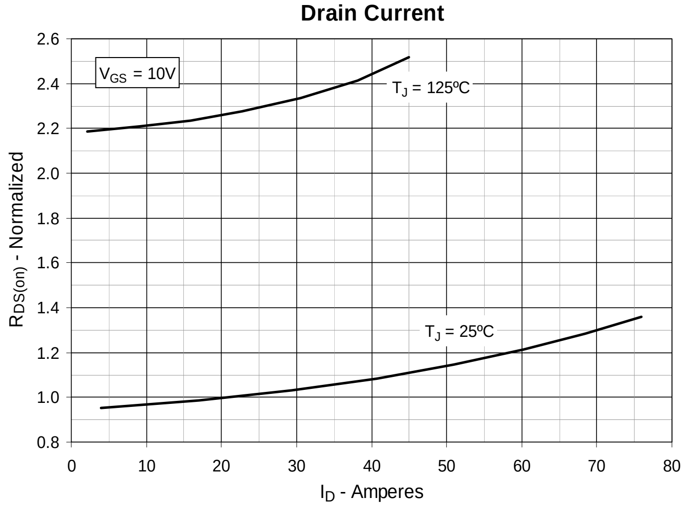


Fig. 6. Maximum Drain Current vs. Case Temperature

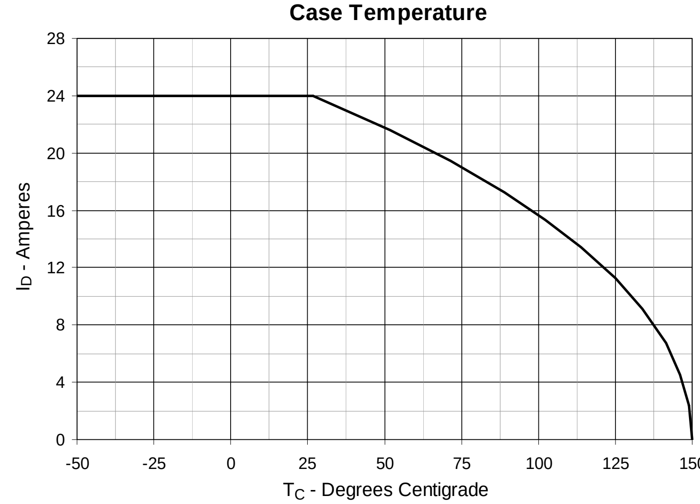


Fig. 7. Input Admittance

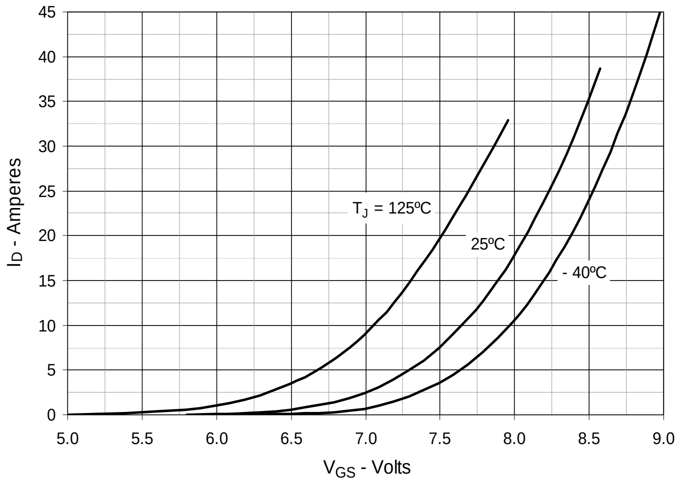


Fig. 8. Transconductance

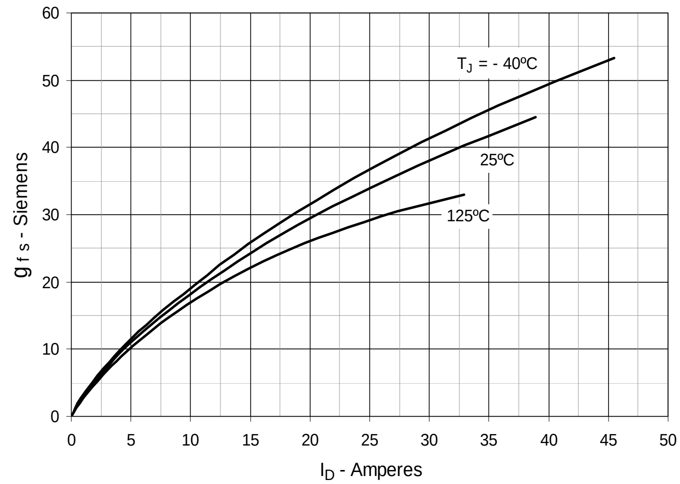


Fig. 9. Forward Voltage Drop of Intrinsic Diode

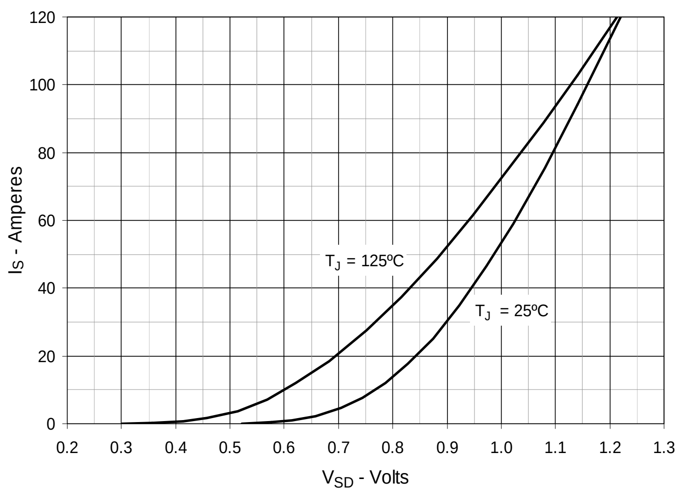


Fig. 10. Gate Charge

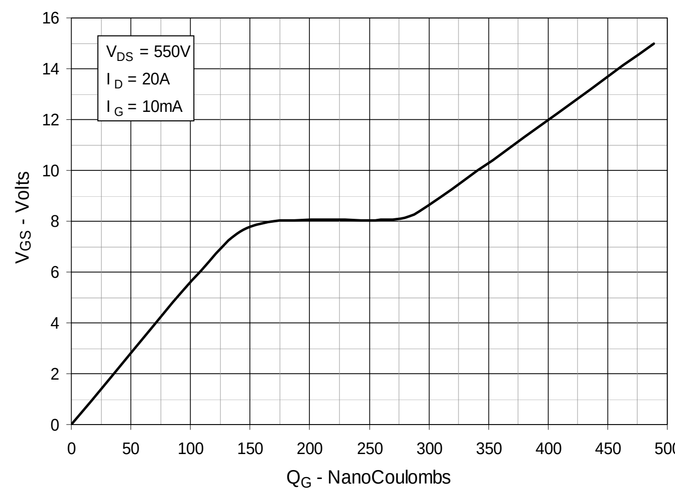


Fig. 11. Capacitance

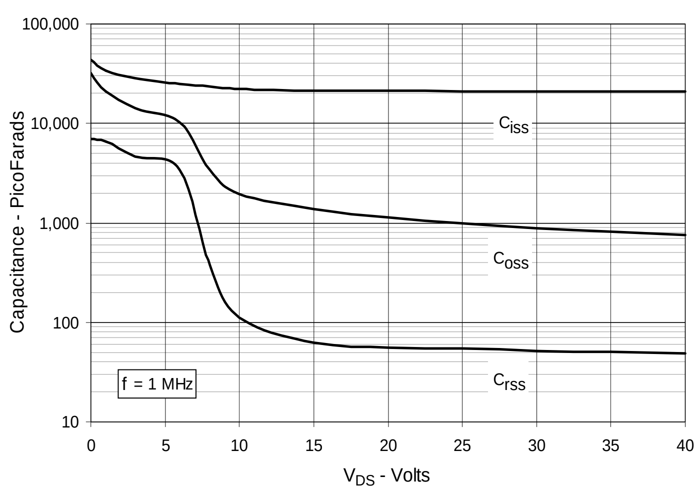
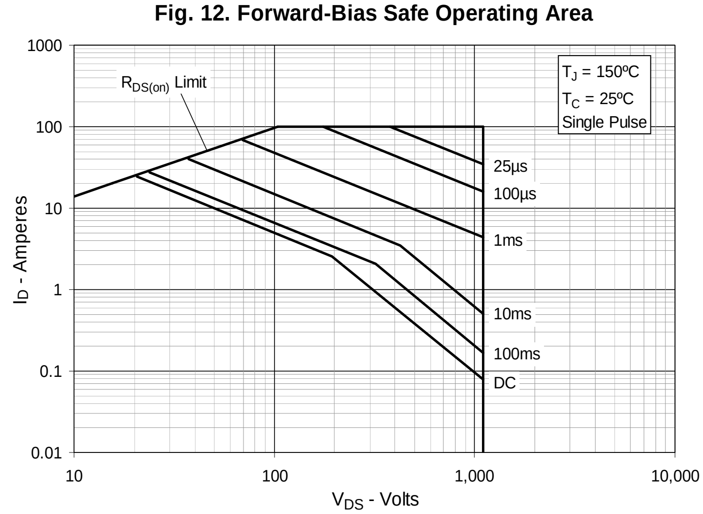


Fig. 12. Forward-Bias Safe Operating Area



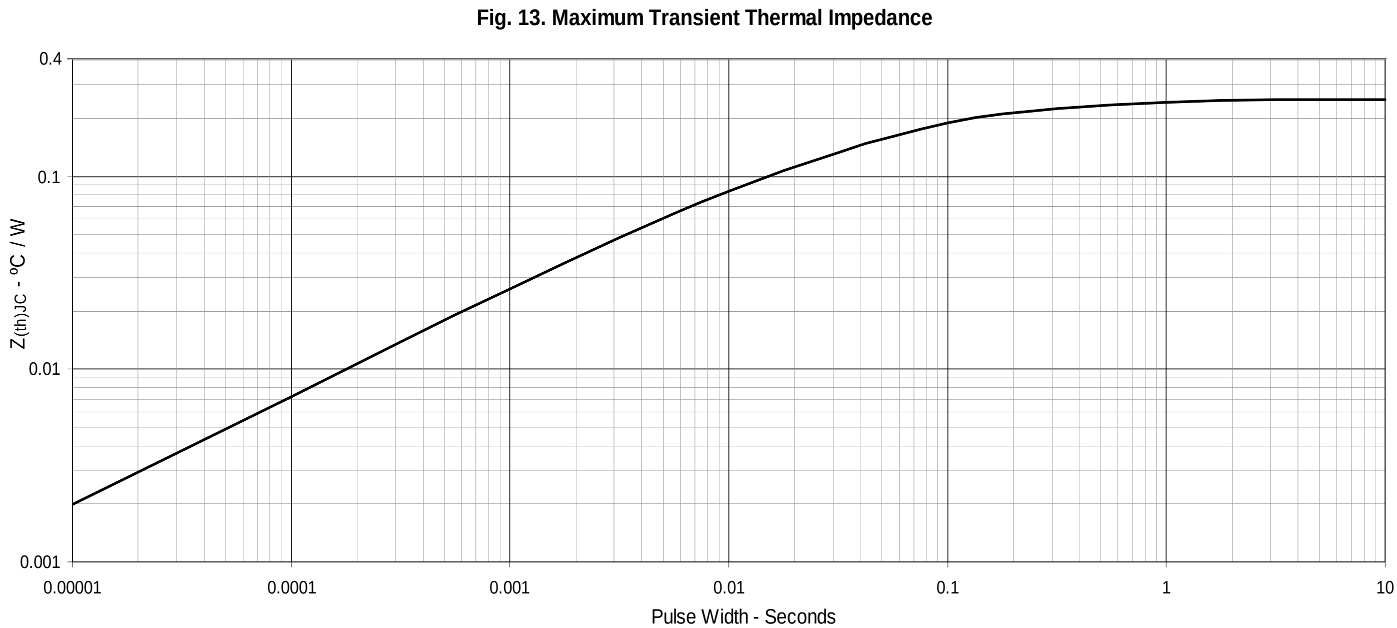
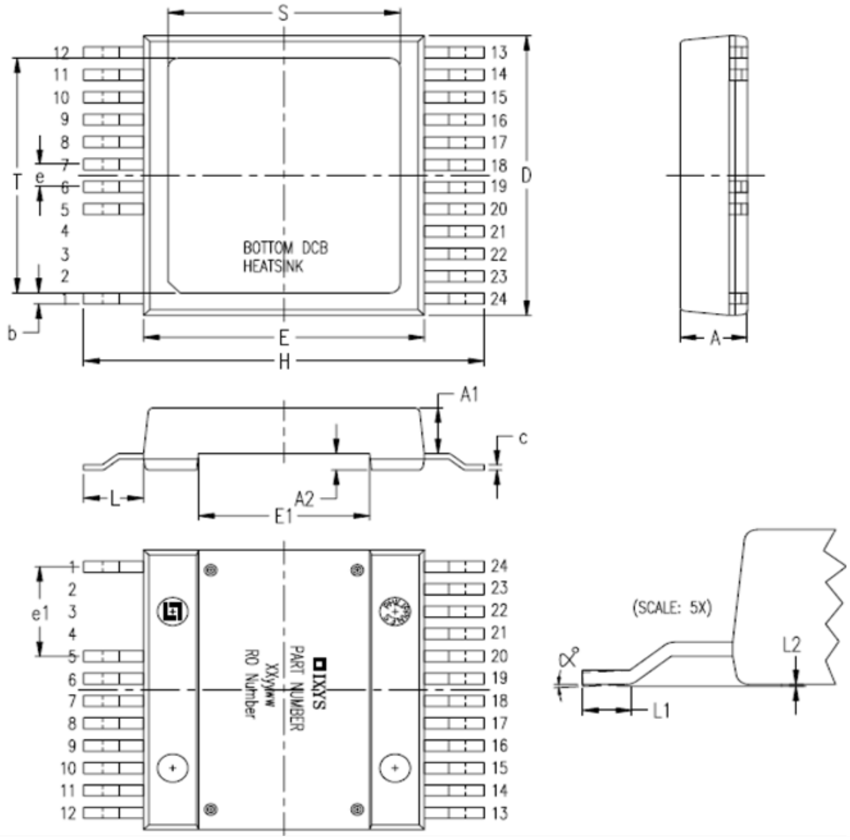


Fig. 13. Maximum Transient Thermal Impedance
0.4
0.1
0.01
0.001
Z(th)JC - ºC / W
0.00001
0.0001
0.001
0.01
0.1
1
10
Pulse Width - Seconds



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.209	.224	5.30	5.70
A1	.154	.161	3.90	4.10
A2	.055	.063	1.40	1.60
b	.035	.045	0.90	1.15
c	.018	.026	0.45	0.65
D	.976	.994	24.80	25.25
E	.898	.915	22.80	23.25
E1	.543	.559	13.80	14.20
e	.079 BSC		2.00 BSC	
e1	.315 BSC		8.00 BSC	
H	1.272	1.311	32.30	33.30
L	.181	.209	4.60	5.30
L1	.051	.067	1.30	1.70
L2	.000	.006	0.00	0.15
S	.736	.760	18.70	19.30
T	.815	.839	20.70	21.30
α	0	4°	0	4°

PIN:
1 = Gate
5-12 = Source
13-24 = Drain