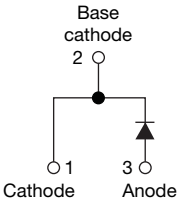
Hyperfast Rectifier, 15 A FRED Pt®



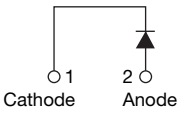
2L TO-220AC



2L TO-220 FULL-PAK



VS-ETH1506-M3



VS-ETH1506FP-M3

FEATURES

- Hyperfast soft recovery time
- Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current
- Fully isolated package (V_{INS} = 2500 V_{RMS})
- True 2 pin package
- Compliant to RoHS Directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- Designed and qualified according to JEDEC-JESD47

RoHS COMPLIANT
HALOGEN FREE

DESCRIPTION/APPLICATIONS

Hyperfast recovery rectifiers designed with optimized performance of forward voltage drop, hyperfast recovery time, and soft recovery.

The planar structure and the platinum doped life time control guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in PFC boost stage in the AC/DC section of SMPS, inverters or as freewheeling diodes.

The extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

PRODUCT SUMMARY	
Package	2L TO-220AC, 2L TO-220FP
$I_{F(AV)}$	15 A
V_R	600 V
V_F at I_F	2.45 V
t_{rr} (typ.)	21 ns
T_J max.	175 °C
Diode variation	Single die

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Peak repetitive reverse voltage	V_{RRM}		600	V
Average rectified forward current in DC — FULL-PAK	$I_{F(AV)}$	T_C = 149 °C	15	A
		T_C = 94 °C		
Non-repetitive peak surge current	I_{FSM}	T_J = 25 °C	160	
Operating junction and storage temperatures	T_J, T_{Stg}		- 65 to 175	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage, blocking voltage	V_{BR}, V_R	I_R = 100 µA	600	-	-	V
Forward voltage	V_F	I_F = 15 A	-	1.8	2.45	
		I_F = 15 A, T_J = 150 °C	-	1.25	1.6	
Reverse leakage current	I_R	V_R = V_R rated	-	0.01	15	µA
		T_J = 150 °C, V_R = V_R rated	-	20	200	
Junction capacitance	C_T	V_R = 600 V	-	12	-	pF
Series inductance	L_S	Measured lead to lead 5 mm from package body	-	8	-	nH

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DiodesAmericas@vishay.com, DiodesAsia@vishay.com, DiodesEurope@vishay.com

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DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 1 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	21	26	ns
		I_F = 15 A, dI_F/dt = 100 A/µs, V_R = 30 V		-	25	36	
		T_J = 25 °C	I_F = 15 A dI_F/dt = 200 A/µs V_R = 390 V	-	29	-	
		T_J = 125 °C		-	65	-	
Peak recovery current	I_{RRM}	T_J = 25 °C		-	3.9	-	A
		T_J = 125 °C		-	7.0	-	
Reverse recovery charge	Q_{rr}	T_J = 25 °C		-	60	-	nC
		T_J = 125 °C		-	240	-	
Reverse recovery time	t_{rr}	T_J = 125 °C	I_F = 15 A dI_F/dt = 800 A/µs V_R = 390 V	-	42	-	ns
Peak recovery current	I_{RRM}			-	21	-	A
Reverse recovery charge	Q_{rr}			-	480	-	nC

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Maximum junction and storage temperature range	T_J, T_{Stg}		- 65	-	175	°C
Thermal resistance, junction to case	R_{thJC}		-	1.2	1.4	°C/W
FULL-PAK			-	3.7	4.3	
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	70	
Typical thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-	
Weight			-	2	-	g
			-	0.07	-	oz.
Mounting torque			6 (5)	-	12 (10)	kgf · cm (lbf · in)
Marking device		Case style 2L TO-220AC	ETH1506			
		Case style 2L TO-220 FULL-PAK	ETH1506FP			

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Revision: 11-Mar-11

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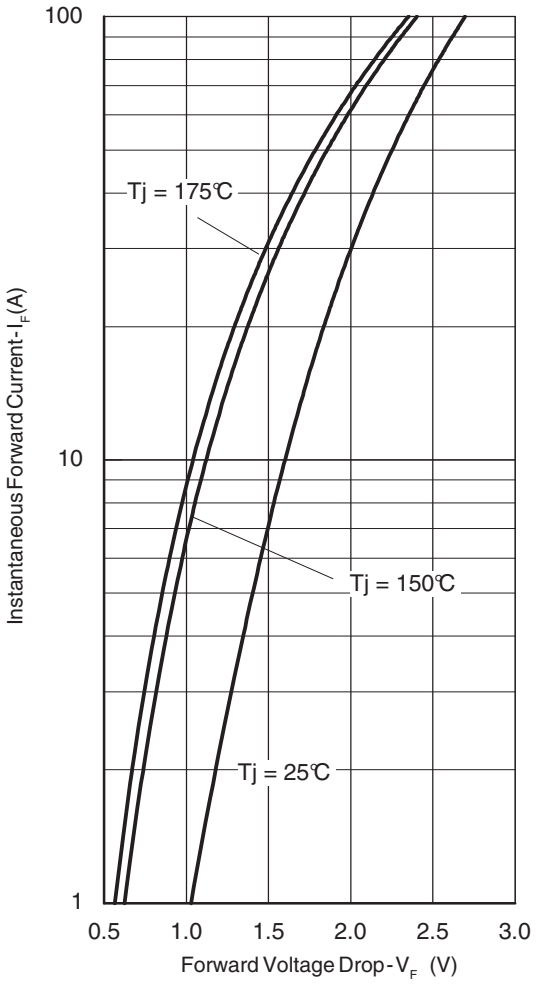


Fig. 1 - Typical Forward Voltage Drop Characteristics

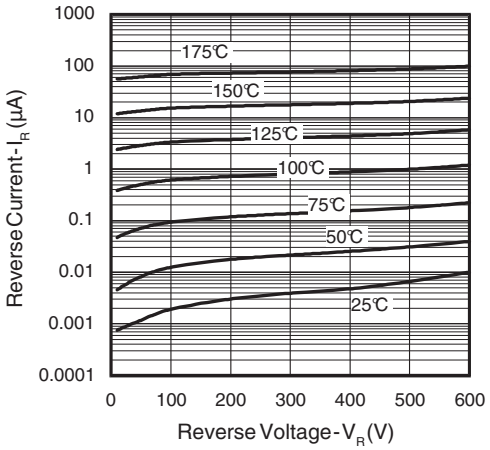


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

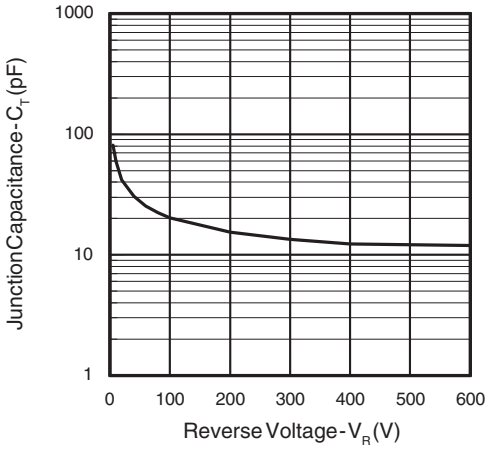


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

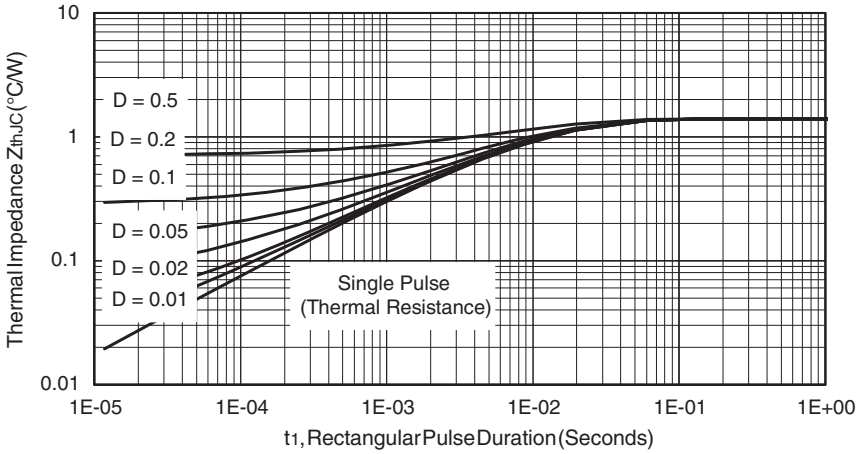


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

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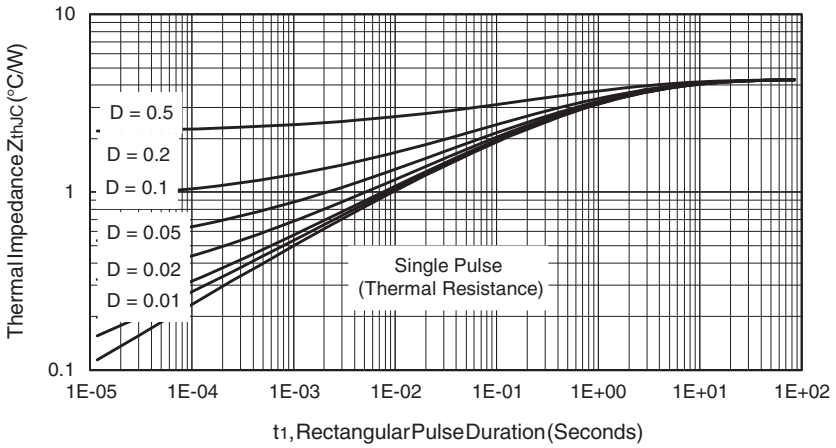


Fig. 5 - Maximum Thermal Impedance Z_{thJC} Characteristics (FULL-PAK)

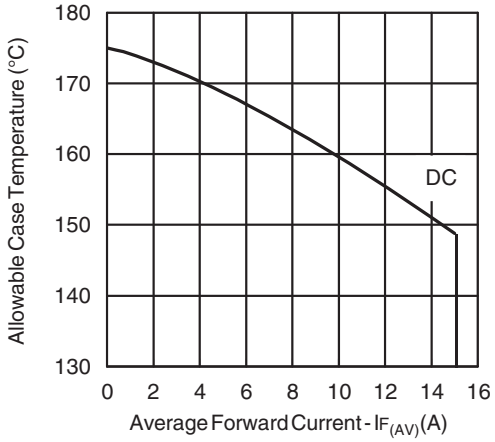


Fig. 6 - Maximum Allowable Case Temperature vs. Average Forward Current

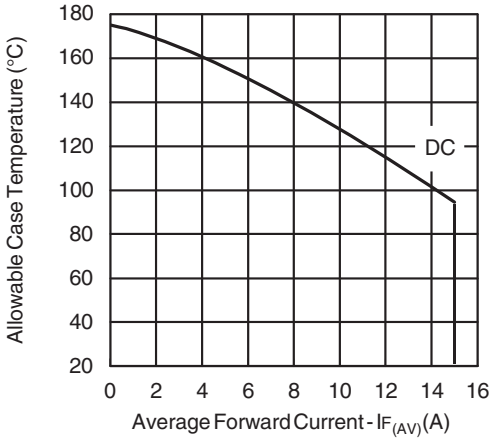


Fig. 7 - Maximum Allowable Case Temperature vs. Average Forward Current (FULL-PAK)

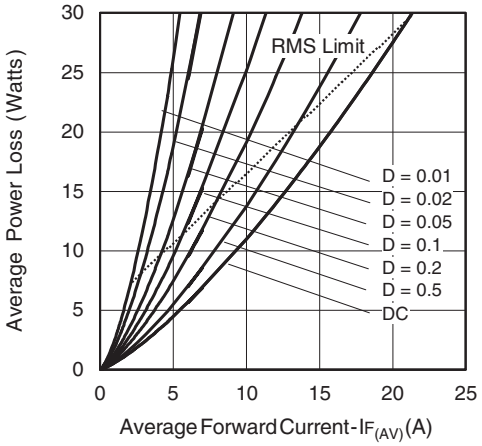


Fig. 8 - Forward Power Loss Characteristics

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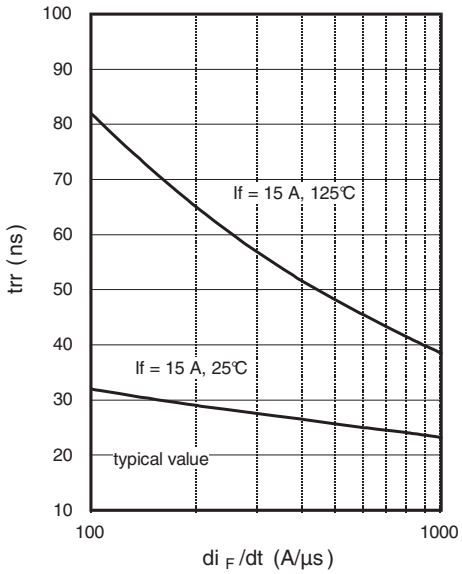


Fig. 9 - Typical Reverse Recovery vs. dI_F/dt

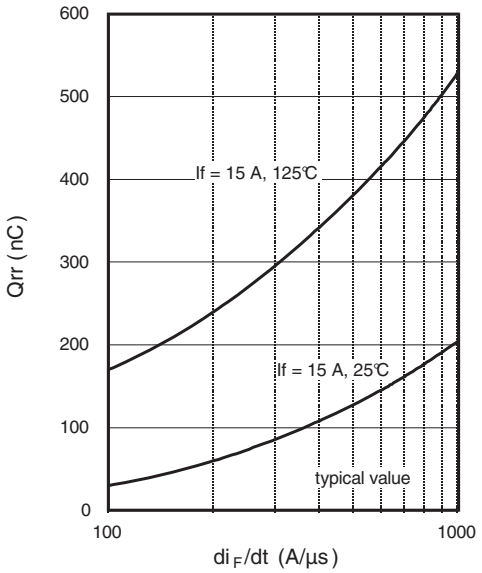


Fig. 10 - Typical Stored Charge vs. dI_F/dt

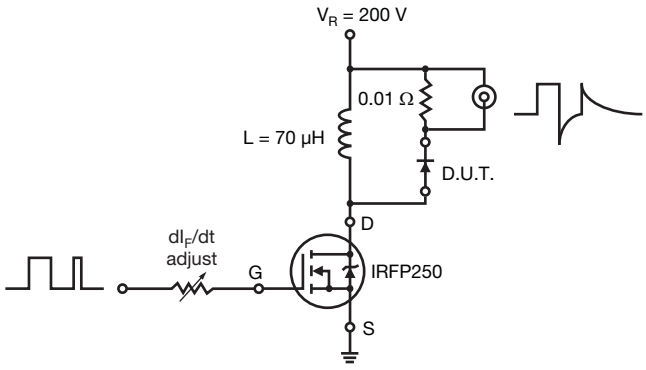
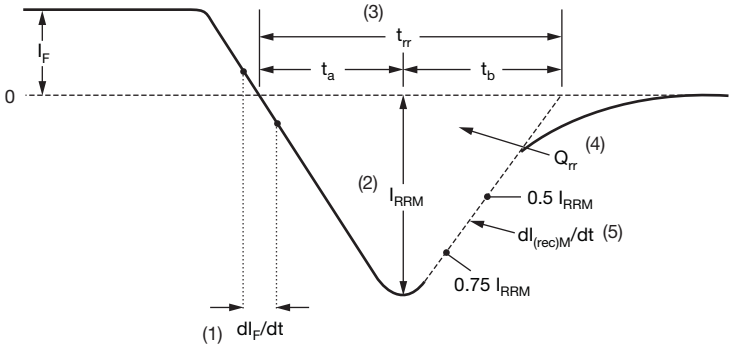


Fig. 11 - Reverse Recovery Parameter Test Circuit



(1) dI_F/dt - rate of change of current through zero crossing

(2) I_{RRM} - peak reverse recovery current

(3) t_{rr} - reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current.

(4) Q_{rr} - area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

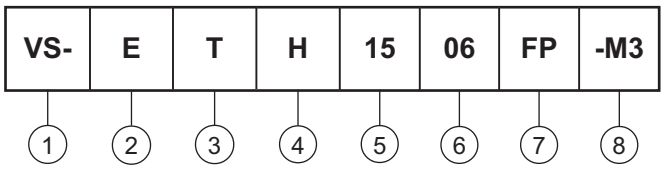
(5) $dI_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 12 - Reverse Recovery Waveform and Definitions

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ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - Circuit configuration:
E = Single diode

3 - T = TO-220

4 - H = Hyperfast recovery time

5 - Current code: 15 = 15 A

6 - Voltage code: 06 = 600 V

7 - • None = TO-220
• FP = FULL-PAK

8 - Environmental digit:
-M3 = Halogen-free, RoHS compliant and terminations lead (Pb)-free

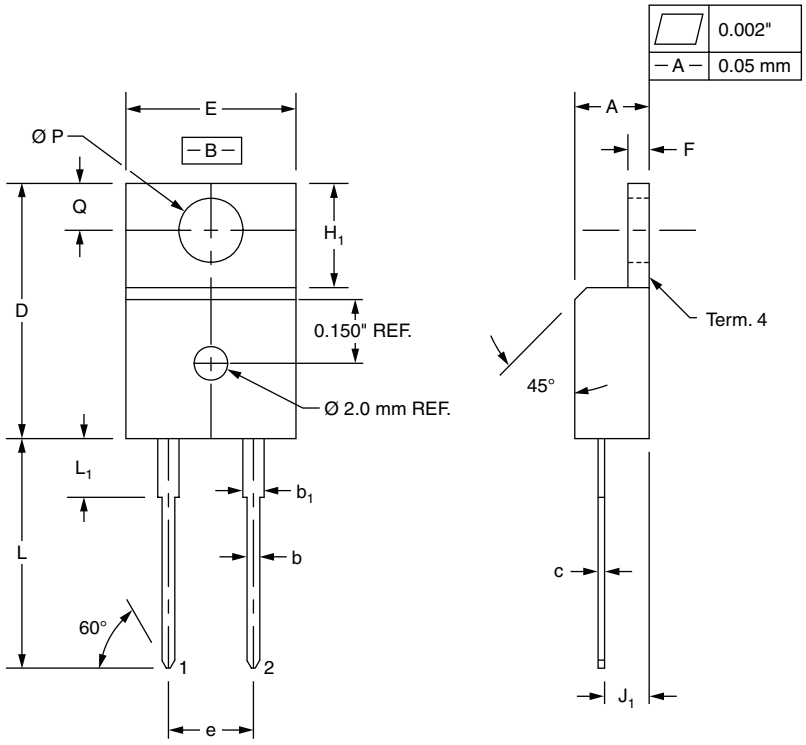
ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER TUBE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-ETH1506-M3	50	1000	Antistatic plastic tube
VS-ETH1506FP-M3	50	1000	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS		
Dimensions	2L TO-220AC	www.vishay.com/doc?95259
	2L TO-220 FULL-PAK	www.vishay.com/doc?95260
Part marking information	2L TO-220AC	www.vishay.com/doc?95391
	2L TO-220 FULL-PAK	www.vishay.com/doc?95392

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True 2 Pin TO-220

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.32	4.57	0.170	0.180
b	0.71	0.91	0.028	0.036
b_1	1.15	1.39	0.045	0.055
c	0.36	0.53	0.014	0.021
D	14.99	15.49	0.590	0.610
E	10.04	10.41	0.395	0.410
e	5.08 BSC		0.200 BSC	
F	1.22	1.37	0.048	0.054
H_1	5.97	6.47	0.235	0.255
J_1	2.54	2.79	0.100	0.110
L	13.47	13.97	0.530	0.550
L_1 (1)	3.31	3.81	0.130	0.150
Ø P	3.79	3.88	0.149	0.153
Q	2.60	2.84	0.102	0.112

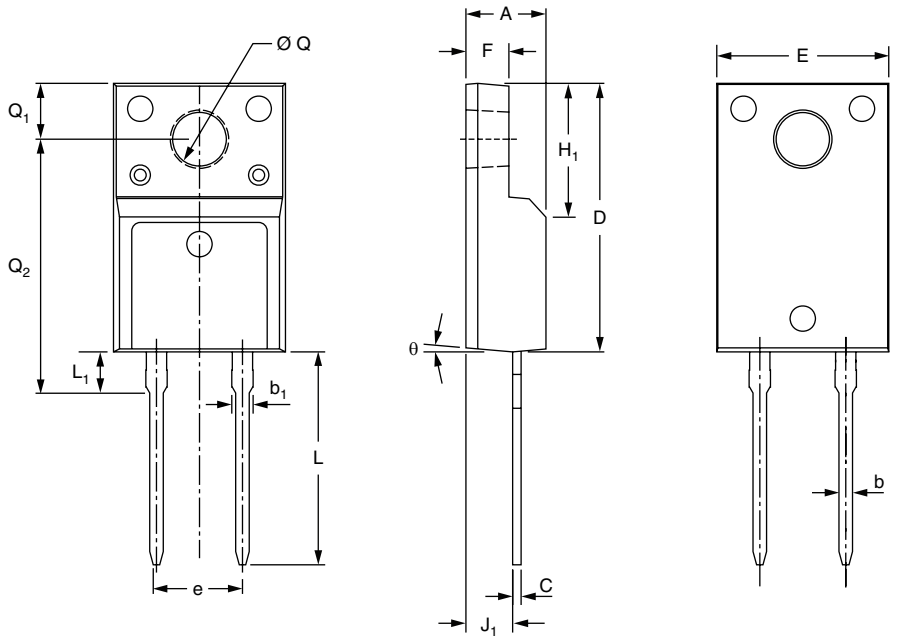
Notes

(1) Lead dimension and finish uncontrolled in L_1

- These dimensions are within allowable dimensions of JEDEC TO-220AB rev. J outline dated 3-24-87
- Controling dimension: Inch

True 2 Pin TO-220 FULL-PAK

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.53	4.93	0.178	0.194
b	0.71	0.91	0.028	0.036
b_1	1.15	1.39	0.045	0.055
C	0.36	0.53	0.014	0.021
D	15.67	16.07	0.617	0.633
E	9.96	10.36	0.392	0.408
e	5.08 typical		0.200 typical	
F	2.34	2.74	0.092	0.107
H_1	6.50	6.90	0.256	0.272
J_1	2.56	2.96	0.101	0.117
L	12.78	13.18	0.503	0.519
L_1	2.23	2.63	0.088	0.104
Ø Q	2.98	3.38	0.117	0.133
Q_1	3.10	3.50	0.122	0.138
Q_2	14.80	15.20	0.583	0.598
θ	0°	5°	0°	5°

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