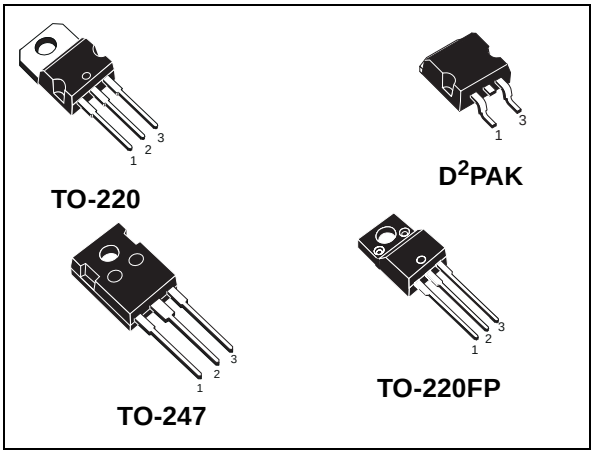
STP11NM80 - STB11NM80
STF11NM80 - STW11NM80

N-CHANNEL 800V - 0.35Ω - 11A TO-220/FP/D²PAK/TO-247
MDmesh™ Power MOSFET

TARGET DATA

TYPE	V_{DSS}	$R_{DS(on)}$	$R_{ds(on)}*Q_g$	I_D
STP11NM80	800 V	< 0.40 Ω	14 Ω*nC	11 A
STF11NM80	800 V	< 0.40 Ω	14 Ω*nC	11 A
STB11NM80	800 V	< 0.40 Ω	14 Ω*nC	11 A
STW11NM80	800 V	< 0.40 Ω	14 Ω*nC	11 A

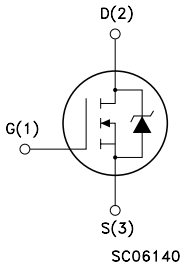
- TYPICAL $R_{DS}(on)$ = 0.35 Ω
- LOW GATE INPUT RESISTANCE
- LOW INPUT CAPACITANCE AND GATE CHARGE
- BEST $R_{ds(on)}$ * Qg IN THE INDUSTRY



DESCRIPTION

The MDmesh™ is a new revolutionary MOSFET technology that associates the Multiple Drain process with the Company's PowerMESH™ horizontal layout. The resulting product has an outstanding low on-resistance, impressively high dv/dt and excellent avalanche characteristics. The adoption of the Company's proprietary strip technique yields overall dynamic performance that is significantly better than that of similar competition's products.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

The 800 V MDmesh™ family is very suitable for single switch applications in particular for Flyback and Forward converter topologies.

ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STP11NM80	P11NM80	TO-220	TUBE
STF11NM80	F11NM80	TO-220FP	TUBE
STB11NM80T4	B11NM80	D²PAK	TAPE & REEL
STW11NM80	W11NM80	TO-247	TUBE

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		TO-220/D²PAK TO-247	TO-220FP	
V_{DS}	Drain-source Voltage (V_{GS} = 0)	800		V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	800		V
V_{GS}	Gate- source Voltage	± 30		V
I_D	Drain Current (continuous) at T_C = 25°C	11	11 (*)	A
I_D	Drain Current (continuous) at T_C = 100°C	4.7	4.7 (*)	A
I_{DM} (•)	Drain Current (pulsed)	44	44 (*)	A
P_{TOT}	Total Dissipation at T_C = 25°C	150	35	W
	Derating Factor	1.2	0.28	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	15		V/ns
T_{stg}	Storage Temperature	–65 to 150		°C
T_j	Max. Operating Junction Temperature			

(•)Pulse width limited by safe operating area
(1)I_{SD}<11A, di/dt<400A/µs, V_{DD}<$V_{(BR)DSS}$, T_J<T_{JMAX}
(*) Limited only by the Maximum Temperature Allowed

THERMAL DATA

			TO-220/D²PAK TO-247	TO-220FP	
Rthj-case	Thermal Resistance Junction-case	Max	0.83	3.6	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max	62.5		°C/W
T_l	Maximum Lead Temperature For Soldering Purpose		300		°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	TBD	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, I_D = 2.5A, V_{DD} = 50 V)	TBD	mJ

ELECTRICAL CHARACTERISTICS (T_{CASE} = 25 °C UNLESS OTHERWISE SPECIFIED)

ON/OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 250 µA, V_{GS} = 0	800			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating			10	µA
		V_{DS} = Max Rating, T_C = 125 °C			100	µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ±30V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 µA	3	4	5	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10 V, I_D = 5.5 A		0.35	0.40	Ω

ELECTRICAL CHARACTERISTICS (CONTINUED)

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, $I_D = 7.5$ A		5		S
C_{iss}	Input Capacitance	$V_{DS} = 30$ V, f = 1 MHz, $V_{GS} = 0$		1900		pF
C_{oss}	Output Capacitance			1000		pF
C_{rss}	Reverse Transfer Capacitance			18		pF
R_G	Gate Input Resistance	f=1 MHz Gate DC Bias = 0 Test Signal Level = 20mV Open Drain		2		Ω

(1)Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 400$ V, $I_D = 5.5$ A $R_G = 4.7\ \Omega$, $V_{GS} = 10$V (see test circuit, Figure 3)		27		ns
t_r	Rise Time			14		ns
Q_g	Total Gate Charge	$V_{DD} = 400$ V, $I_D = 11$ A, $V_{GS} = 10$ V		40	58	nC
Q_{gs}	Gate-Source Charge			10		nC
Q_{gd}	Gate-Drain Charge			24		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 640$ V, $I_D = 11$A, $R_G = 4.7\ \Omega$, $V_{GS} = 10$V (see test circuit, Figure 5)		6		ns
t_f	Fall Time			11		ns
t_c	Cross-over Time			21		ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				11	A
I_{SDM} (2)	Source-drain Current (pulsed)				44	A
V_{SD} (1)	Forward On Voltage	$I_{SD} = 11$ A, $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 11$ A, di/dt = 100A/µs, $V_{DD} = 100$V, $T_j = 150$°C (see test circuit, Figure 5)		496		ns
Q_{rr}	Reverse Recovery Charge			6.5		µC
I_{RRM}	Reverse Recovery Current			26		A

Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
2. Pulse width limited by safe operating area.

Fig. 1: Unclamped Inductive Load Test Circuit

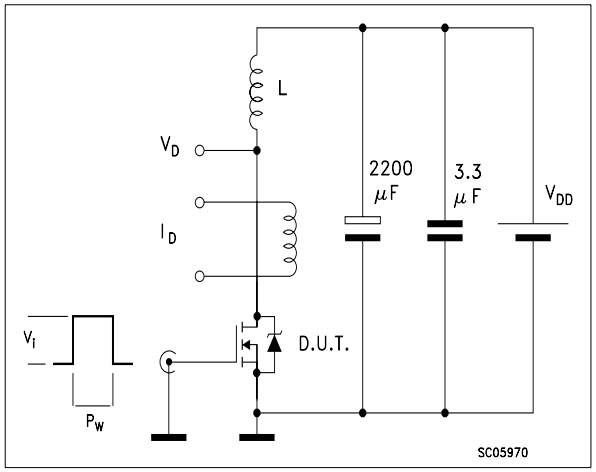


Fig. 2: Unclamped Inductive Waveform

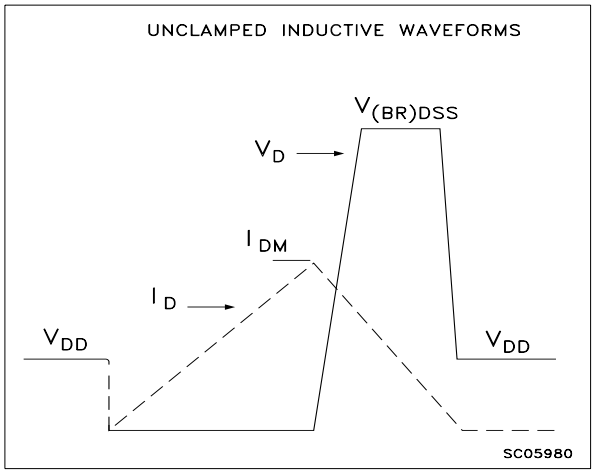


Fig. 3: Switching Times Test Circuit For Resistive Load

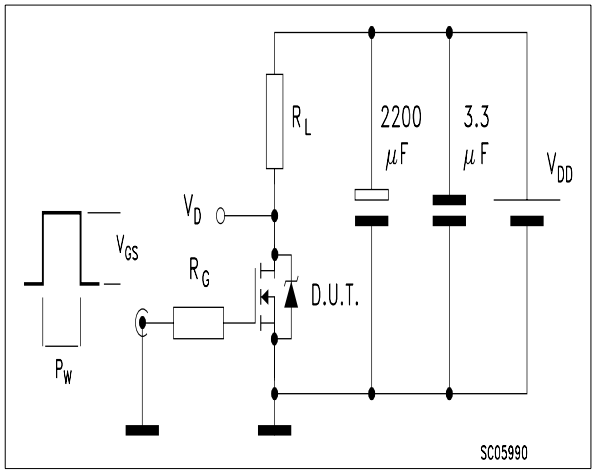


Fig. 4: Gate Charge test Circuit

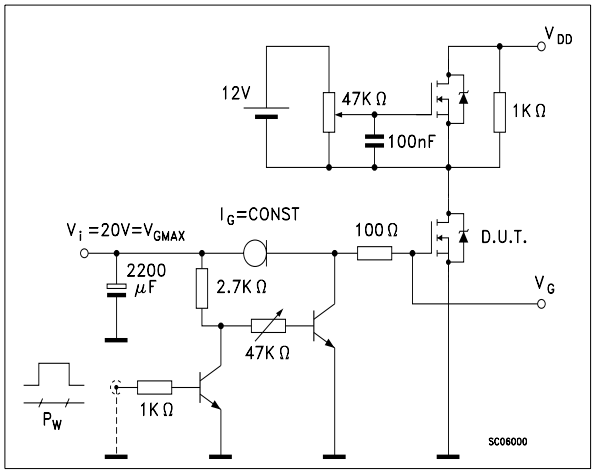
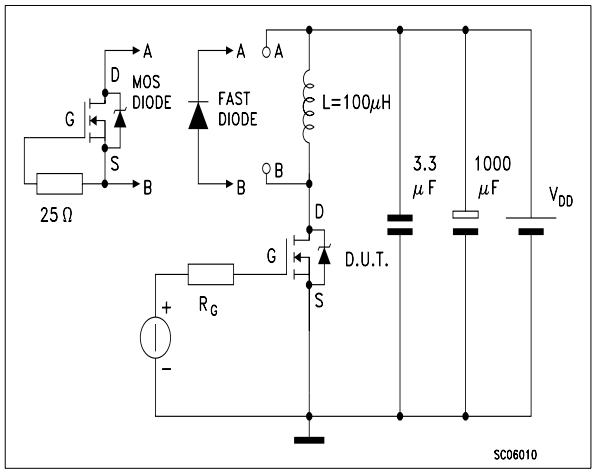
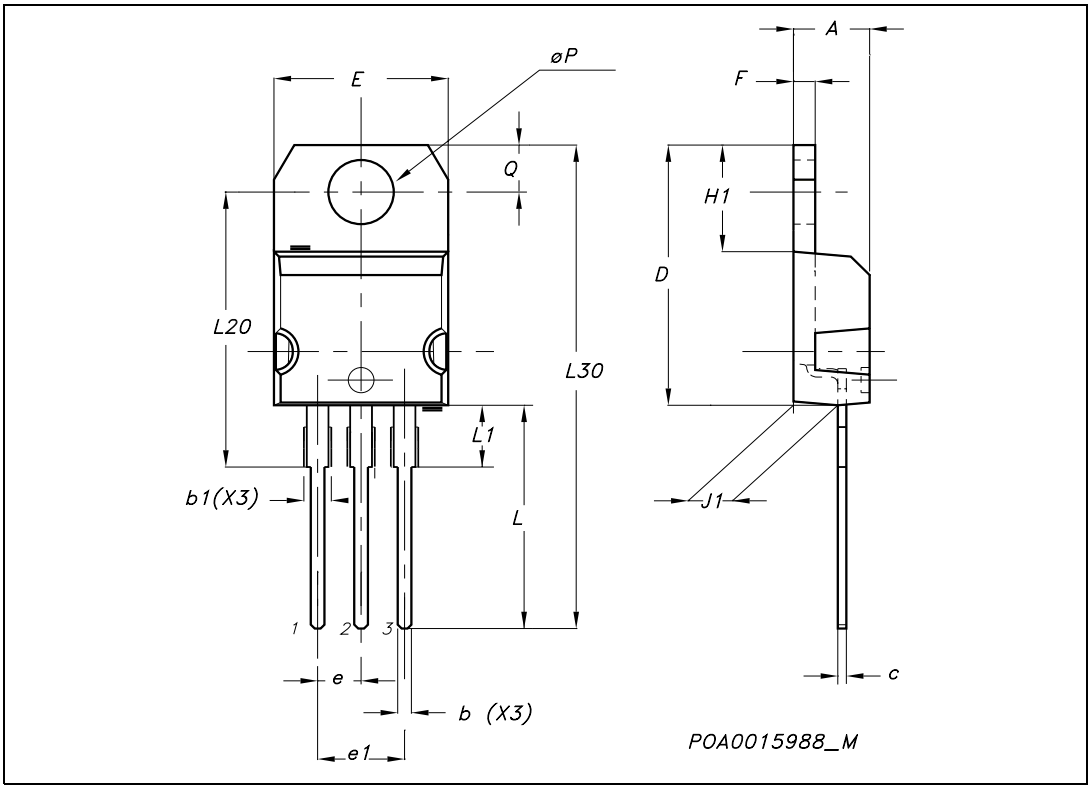


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



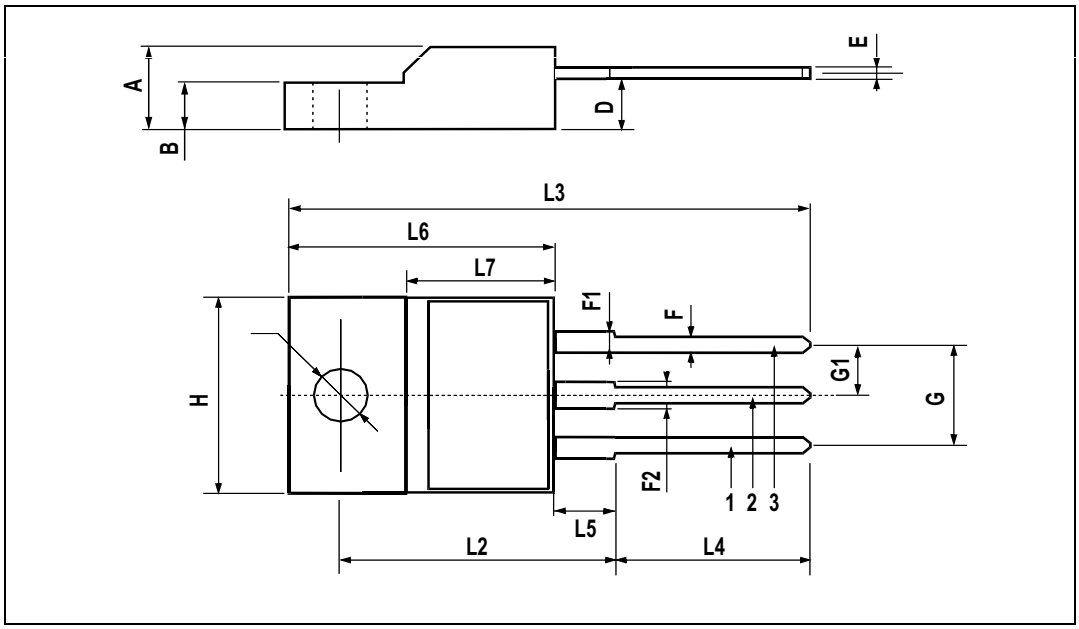
TO-220 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



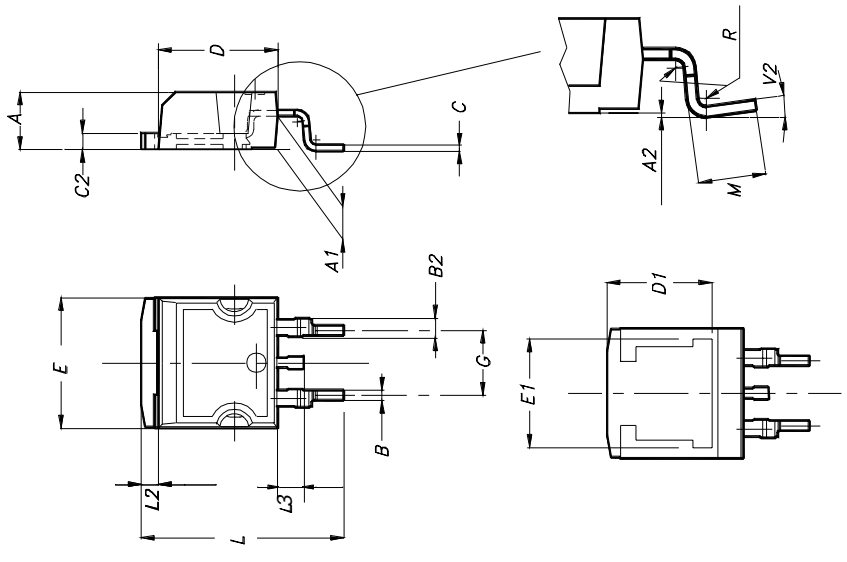
TO-220FP MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	.0385		0.417
L5	2.9		3.6	0.114		0.141
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126



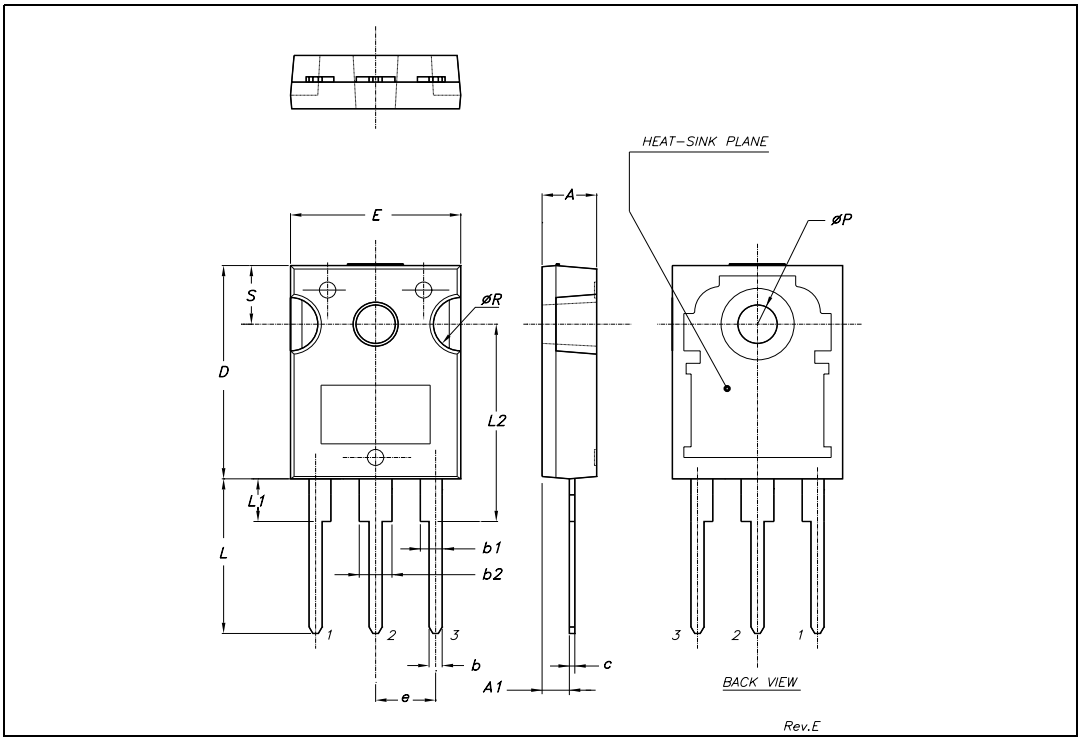
D^2PAK MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0º		8º			

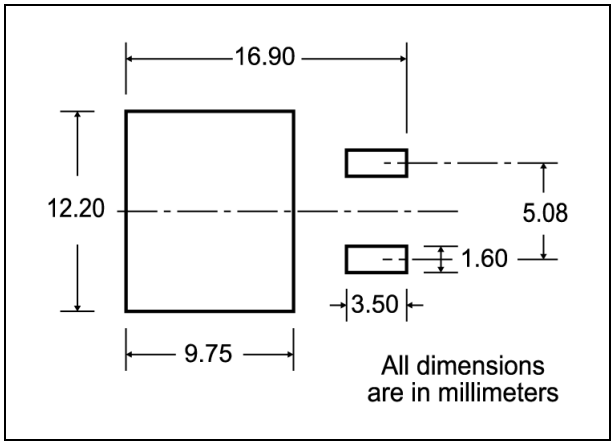


TO-247 MECHANICAL DATA

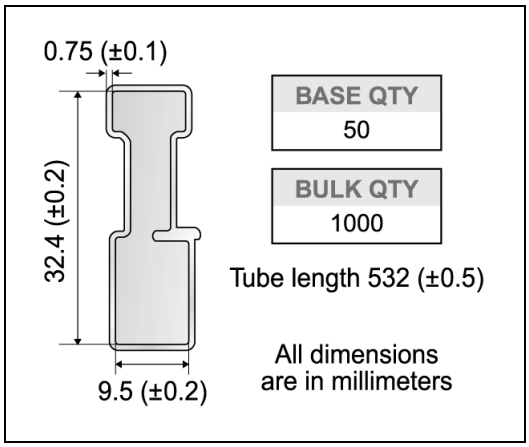
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.079		0.094
b2	3.0		3.40	0.118		0.134
c	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e		5.45			0.214	
L	14.20		14.80	0.560		0.582
L1	3.70		4.30	0.14		0.17
L2		18.50			0.728	
øP	3.55		3.65	0.140		0.143
øR	4.50		5.50	0.177		0.216
S		5.50			0.216	



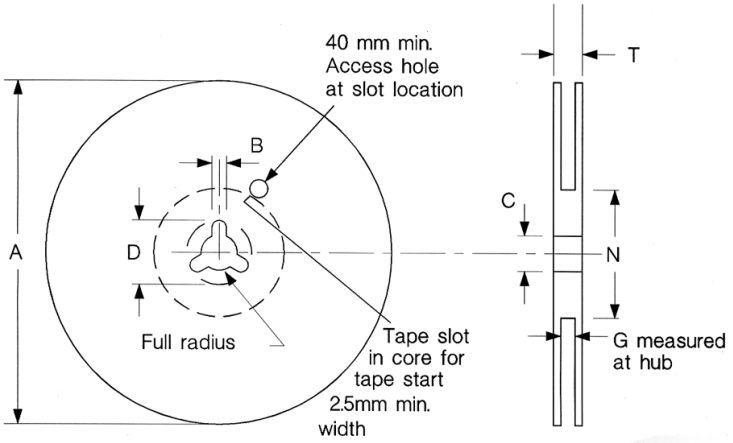
D^2PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*



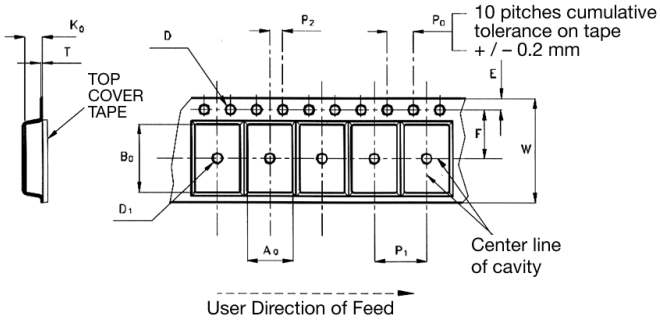
REEL MECHANICAL DATA

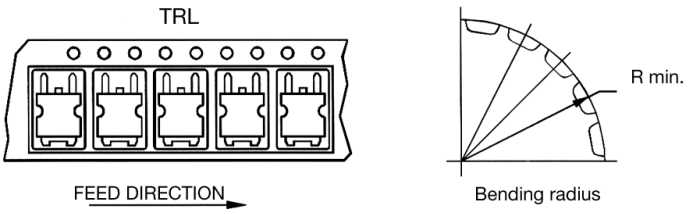
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	11.9	12.1	0.468	0.476
P2	1.9	2.1	0.075	0.082
R	50		1.574	
T	0.25	0.35	0.0098	0.0137
W	23.7	24.3	0.933	0.956





* on sales type