



# STP11NM80 - STB11NM80 STF11NM80 - STW11NM80

N-CHANNEL 800V - 0.35Ω - 11A TO-220/FP/D<sup>2</sup>PAK/TO-247

MDmesh™ Power MOSFET

TARGET DATA

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	R <sub>ds(on)</sub> *Q <sub>g</sub>	I <sub>D</sub>
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

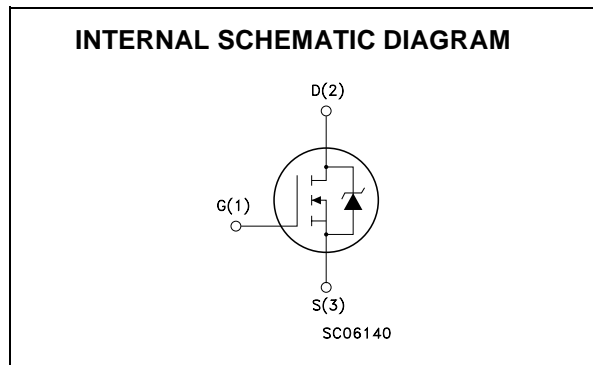
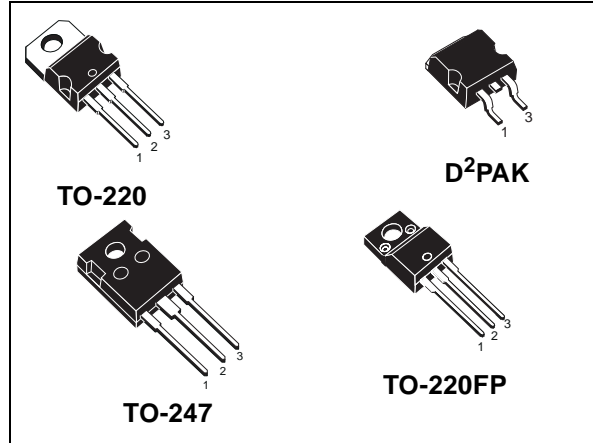
- TYPICAL R<sub>DS(on)</sub> = 0.35 Ω
- LOW GATE INPUT RESISTANCE
- LOW INPUT CAPACITANCE AND GATE CHARGE
- BEST R<sub>ds(on)</sub> \* Q<sub>g</sub> IN THE INDUSTRY

## 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.

## 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	D <sup>2</sup> PAK	TAPE & REEL
STW11NM80	W11NM80	TO-247	TUBE

# STP11NM80 - STB11NM80 - STF11NM80 - STW11NM80

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		TO-220/D <sup>2</sup> PAK TO-247	TO-220FP	
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	800		V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	800		V
V <sub>GS</sub>	Gate- source Voltage	± 30		V
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 25°C	11	11 (*)	A
I <sub>D</sub>	Drain Current (continuous) at T <sub>C</sub> = 100°C	4.7	4.7 (*)	A
I <sub>DM</sub> (•)	Drain Current (pulsed)	44	44 (*)	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 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 <sub>stg</sub>	Storage Temperature	-65 to 150		°C
T <sub>j</sub>	Max. Operating Junction Temperature			

(•) Pulse width limited by safe operating area

(1) I<sub>SD</sub> < 11A, di/dt < 400A/μs, V<sub>DD</sub> < V<sub>(BR)DSS</sub>, T<sub>J</sub> < T<sub>JMAX</sub>

(\*) Limited only by the Maximum Temperature Allowed

## THERMAL DATA

		TO-220/D <sup>2</sup> PAK TO-247	TO-220FP	
R <sub>thj-case</sub>	Thermal Resistance Junction-case Max	0.83	3.6	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient Max	62.5		°C/W
T <sub>I</sub>	Maximum Lead Temperature For Soldering Purpose	300		°C

## AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I <sub>AR</sub>	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T <sub>j</sub> max)	TBD	A
E <sub>AS</sub>	Single Pulse Avalanche Energy (starting T <sub>j</sub> = 25 °C, I <sub>D</sub> = 2.5A, V <sub>DD</sub> = 50 V)	TBD	mJ

## ELECTRICAL CHARACTERISTICS (T<sub>CASE</sub> = 25 °C UNLESS OTHERWISE SPECIFIED) ON/OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source Breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0	800			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max Rating V <sub>DS</sub> = Max Rating, T <sub>C</sub> = 125 °C			10 100	μA μA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ±30V			100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	3	4	5	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 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		$\Omega$

(1) Pulsed: Pulse duration = 300  $\mu$ s, 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**

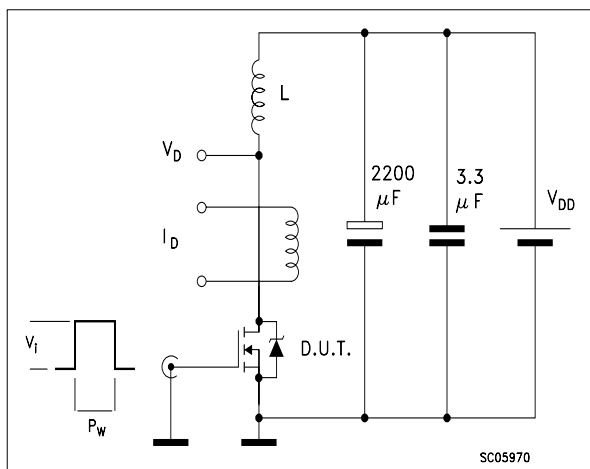
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{DD} = 640$ V, $I_D = 11$ A, $R_G = 4.7$ $\Omega$ , $V_{GS} = 10$ V (see test circuit, Figure 5)		6		ns
$t_f$	Fall Time			11		ns
$t_c$	Cross-over Time			21		ns

**SOURCE DRAIN DIODE**

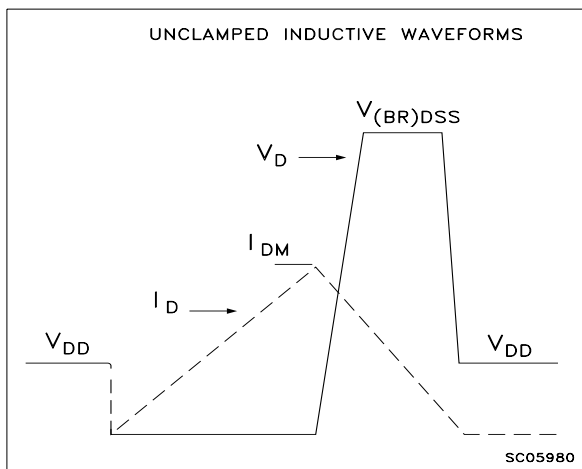
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				11	A
$I_{SDM}$ (2)	Source-drain Current (pulsed)				44	A
$V_{SD}$ (1)	Forward On Voltage	$I_{SD} = 11$ A, $V_{GS} = 0$			1.5	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 11$ A, $di/dt = 100$ A/ $\mu$ s, $V_{DD} = 100$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

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

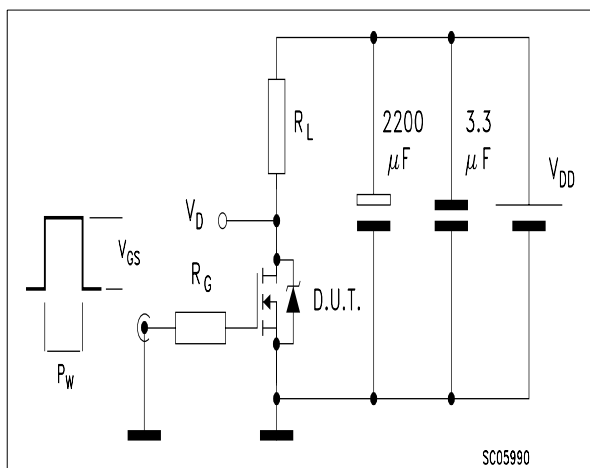
**Fig. 1: Unclamped Inductive Load Test Circuit**



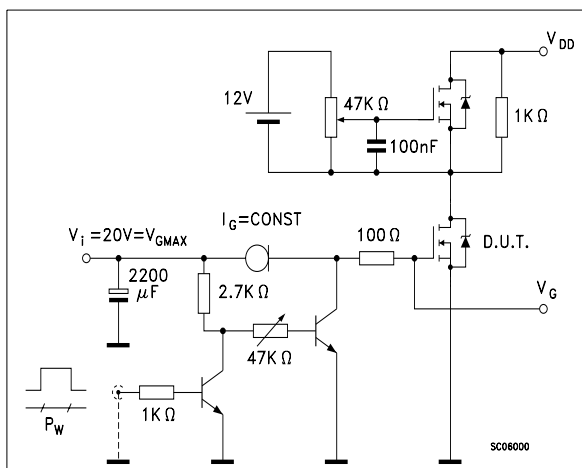
**Fig. 2: Unclamped Inductive Waveform**



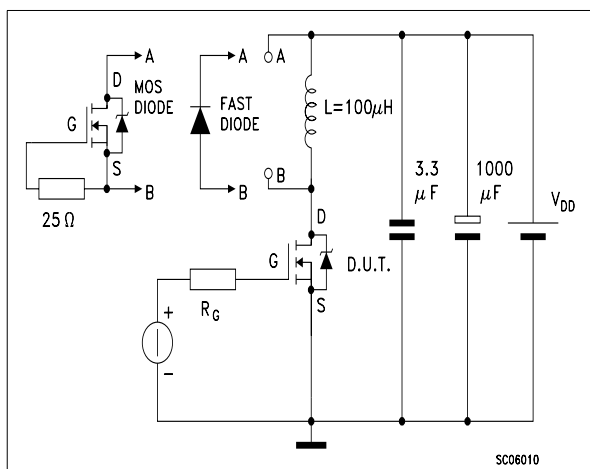
**Fig. 3: Switching Times Test Circuit For Resistive Load**



**Fig. 4: Gate Charge test Circuit**

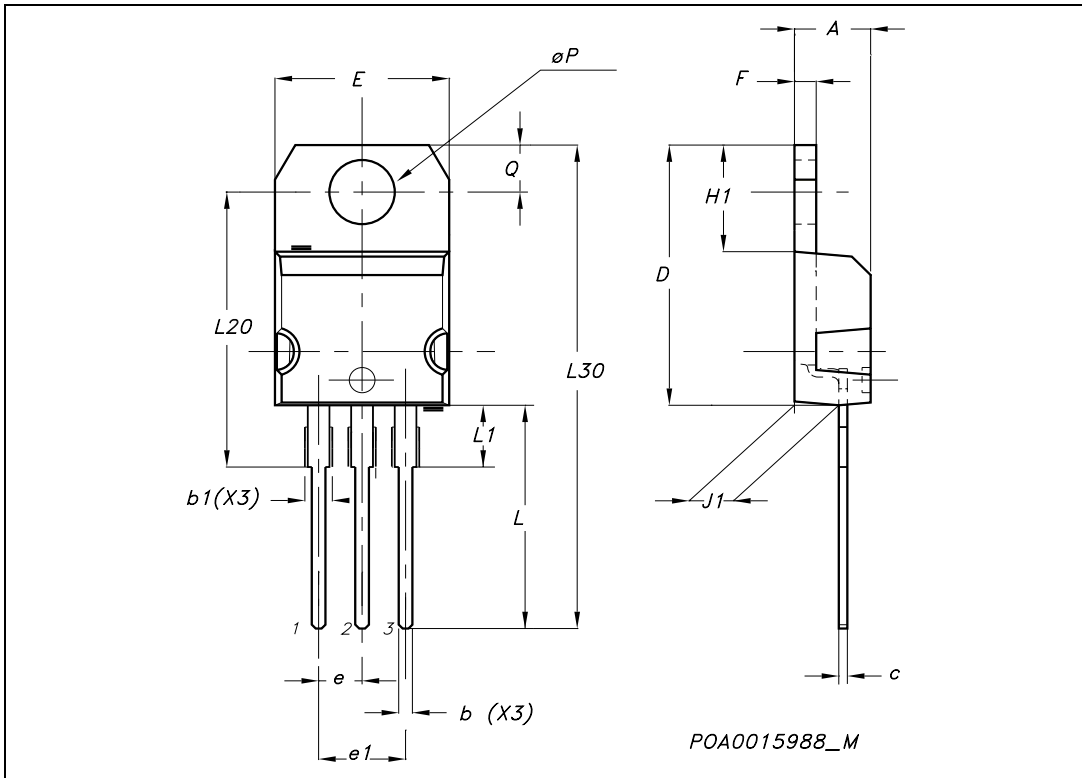


**Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times**



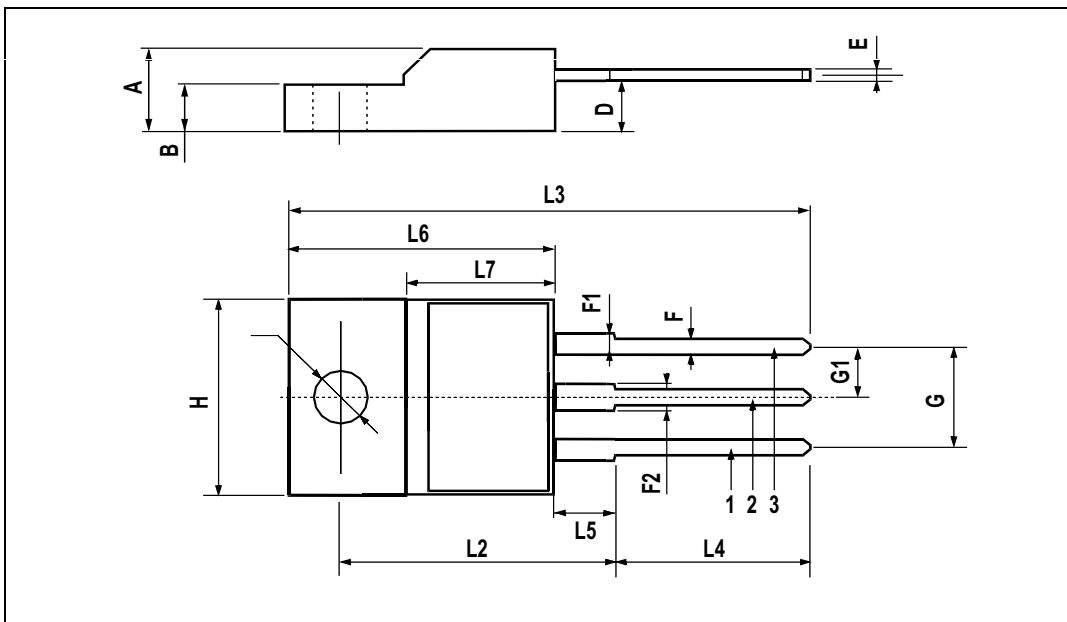
TO-220 MECHANICAL DATA

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



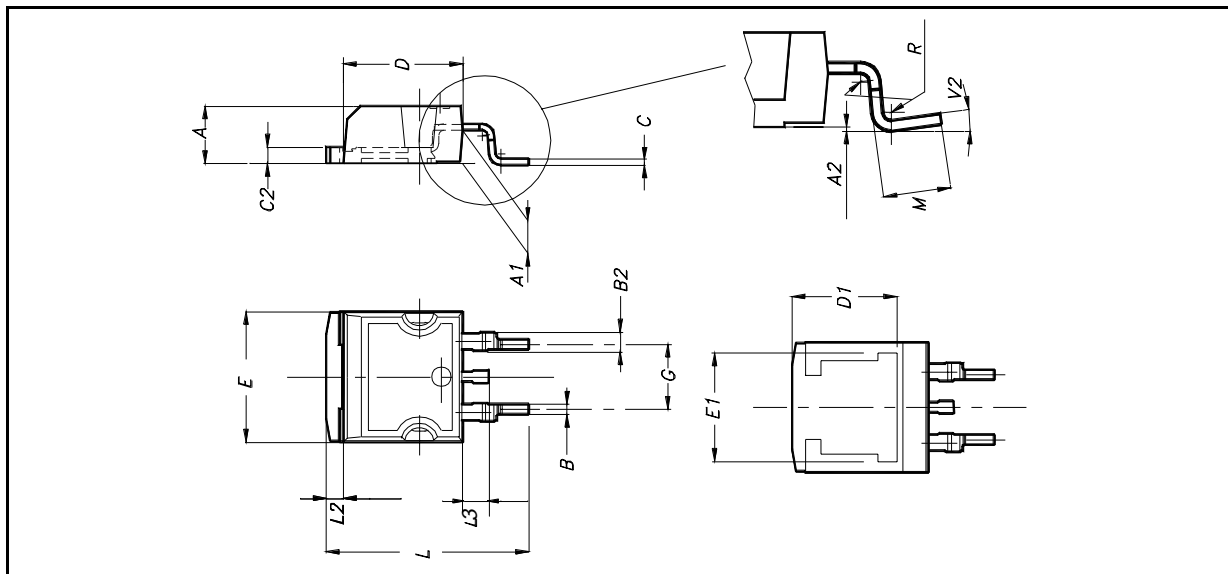
**TO-220FP MECHANICAL DATA**

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



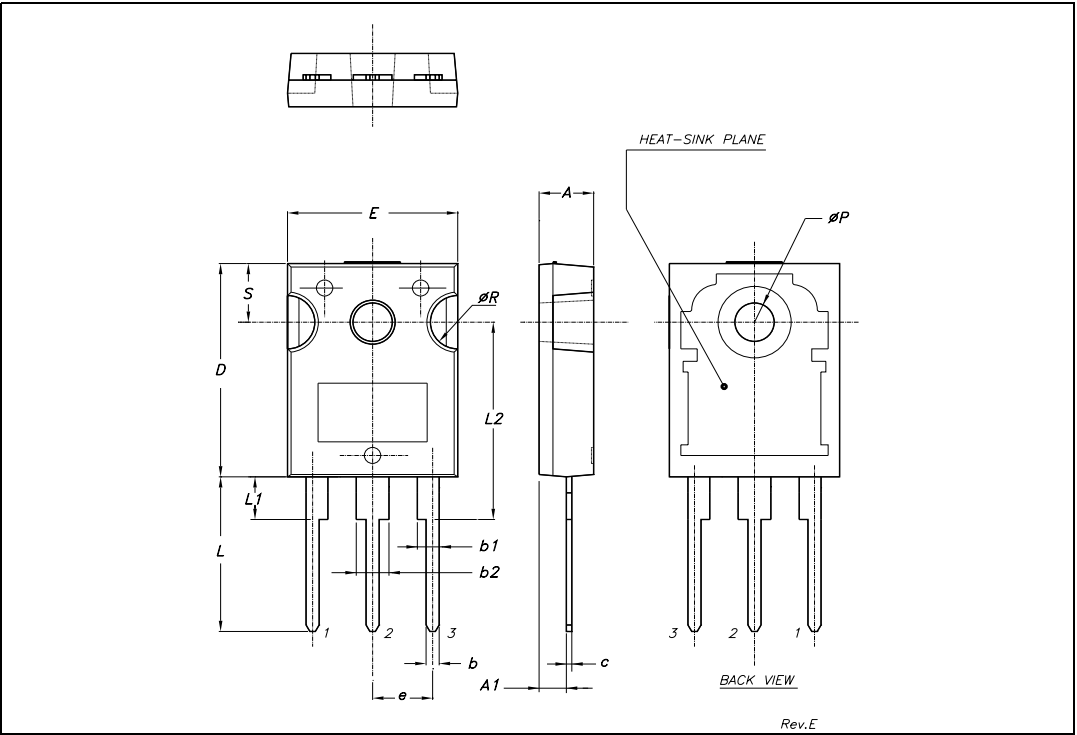
**D<sup>2</sup>PAK MECHANICAL DATA**

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	0°		8°			



**TO-247 MECHANICAL DATA**

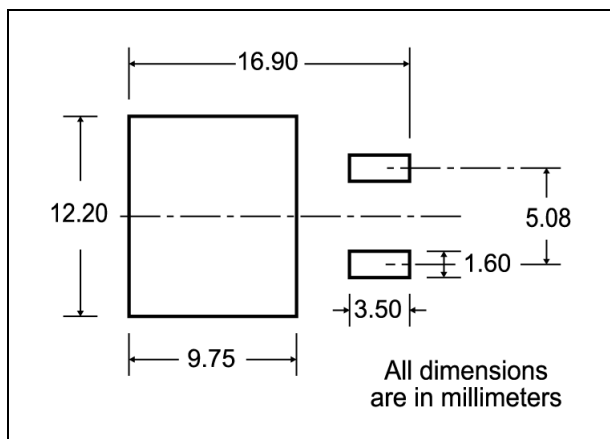
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.079		0.094
b2	3.0		3.40	0.118		0.134
c	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e		5.45			0.214	
L	14.20		14.80	0.560		0.582
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	



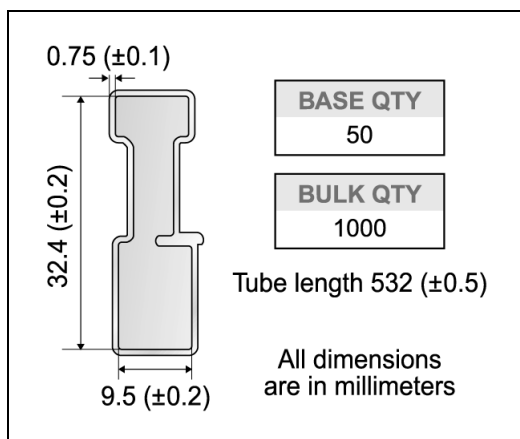
Rev.E



**D<sup>2</sup>PAK FOOTPRINT**



**TUBE SHIPMENT (no suffix)\***



**TAPE AND REEL SHIPMENT (suffix "T4")\***

Diagram showing the tape mechanical data. It includes a circular hub with a diameter of A, a central slot with a width of D, and a full radius. A tape slot in the core for tape start has a width of 2.5 mm min. An access hole at the slot location has a diameter of 40 mm min. The tape thickness is T, and the hub thickness is C. The distance from the center of the hub to the center of the slot is B. The distance from the center of the hub to the center of the tape slot is N. The distance from the center of the hub to the center of the tape slot is G, measured at the hub.

**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

**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		0.795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

**BASE QTY**: 1000  
**BULK QTY**: 1000

Diagram showing the reel mechanical data. It includes a top cover tape with a thickness of K<sub>0</sub> and a width of T. The distance from the center of the hub to the center of the tape slot is B<sub>0</sub>. The distance from the center of the hub to the center of the tape slot is D<sub>1</sub>. The distance from the center of the hub to the center of the tape slot is D. The distance from the center of the hub to the center of the tape slot is P<sub>2</sub>. The distance from the center of the hub to the center of the tape slot is P<sub>0</sub>. The distance from the center of the hub to the center of the tape slot is E. The distance from the center of the hub to the center of the tape slot is F. The distance from the center of the hub to the center of the tape slot is W. The distance from the center of the hub to the center of the tape slot is A<sub>0</sub>. The distance from the center of the hub to the center of the tape slot is P<sub>1</sub>. The center line of the cavity is shown. The user direction of feed is indicated. The bending radius is R min.

**TRAIL**

Diagram showing the TRAIL (Tape Reel Lead) with a feeding direction and a bending radius R min.

\* on sales type



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