



STB18NM80, STF18NM80 STP18NM80, STW18NM80

N-channel 800 V, 0.25 Ω , 17 A, MDmesh™ Power MOSFET
D²PAK, TO-220FP, TO-220, TO-247

Features

Type	V _{DSS} (@T _{jmax})	R _{DS(on)} max	I _D
STB18NM80	800 V	< 0.295 Ω	17 A
STF18NM80	800 V	< 0.295 Ω	17 A
STP18NM80	800 V	< 0.295 Ω	17 A ⁽¹⁾
STW18NM80	800 V	< 0.295 Ω	17 A

- Limited only by maximum temperature allowed
- High dv/dt and avalanche capabilities
 - 100% avalanche tested
 - Low input capacitance and gate charge
 - Low gate input resistance
 - Tight process control and high manufacturing yields

Application

- Switching applications

Description

The MDmesh™ is a new revolutionary Power 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 competitor's products.

Table 1. Device summary

Order codes	Marking	Package	Packaging
STB18NM80	18NM80	D ² PAK	Tape and reel
STF18NM80	18NM80	TO-220FP	Tube
STP18NM80	18NM80	TO-220	Tube
STW18NM80	18NM80	TO-247	Tube

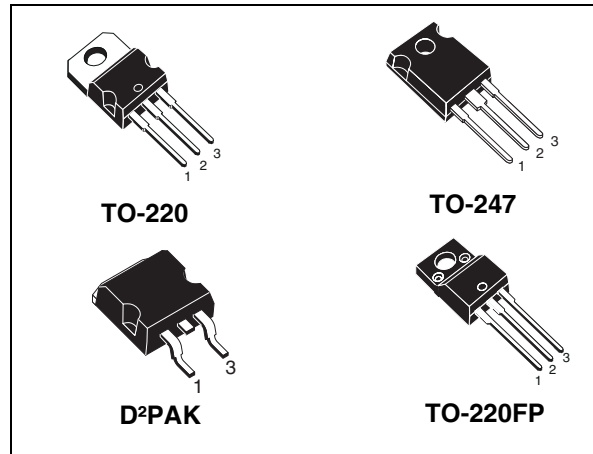
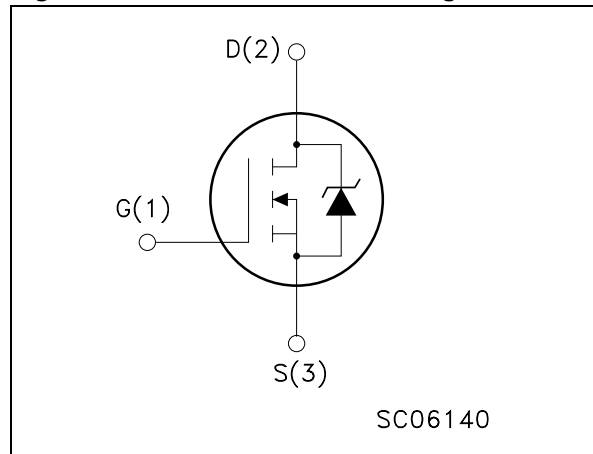


Figure 1. Internal schematic diagram



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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value				Unit
		TO-220	D ² PAK	TO-247	TO-220FP	
V _{DS}	Drain-source voltage (V _{GS} = 0)	800				V
V _{GS}	Gate-source voltage	± 30				V
I _D	Drain current (continuous) at T _C = 25 °C	17		17 ⁽¹⁾		A
I _D	Drain current (continuous) at T _C = 100 °C	10.71		10.71 ⁽¹⁾		A
I _{DM} ⁽²⁾	Drain current (pulsed)	68		68 ⁽¹⁾		A
P _{TOT}	Total dissipation at T _C = 25 °C	190		40		W
V _{ISO}	Insulation withstand voltage (RMS) from all three leads to external heat sink (t = 1 s; T _C = 25 °C)	2500				V
dv/dt ⁽³⁾	Peak diode recovery voltage slope	15				V/ns
T _{stg}	Storage temperature	-65 to 150				°C
T _j	Max. operating junction temperature	150				°C

- Limited only by maximum temperature allowed
- Pulse width limited by safe operating area
- I_{SD} ≤ 17 A, di/dt ≤ 400 A/μs, V_{DD} = 80% V_{(BR)DSS}

Table 3. Thermal data

Symbol	Parameter	Value				Unit
		TO-220	D ² PAK	TO-247	TO-220FP	
R _{thj-case}	Thermal resistance junction-case	0.66		3.13		°C/W
R _{thj-amb}	Thermal resistance junction-amb	62.5		50	62.5	°C/W
R _{thj-pcb}	Thermal resistance junction-pcb		30			°C/W
T _l	Maximum lead temperature for soldering purpose	300				°C

Table 4. Avalanche characteristics

Symbol	Parameter	Max value	Unit
I _{AS}	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 = I _{AS} , V _{DD} = 50 V)	TBD	mJ

2 Electrical characteristics

(T_{CASE} = 25 °C unless otherwise specified)

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source breakdown voltage	I _D = 1 mA, V _{GS} = 0	800			V
I _{DSS}	Zero gate voltage drain current (V _{GS} = 0)	V _{DS} = Max rating, V _{DS} = Max rating, T _c = 125 °C			10 100	nA nA
I _{GSS}	Gate body leakage current (V _{DS} = 0)	V _{GS} = ± 30 V			±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} = 10V, I _D = 8.5 A		0.25	0.295	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g _{fs} ⁽¹⁾	Forward transconductance	V _{DS} > I _{D(on)} × R _{DS(on)max} , I _D = 8.5 A	-	15	-	S
C _{iss} C _{oss} C _{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V _{DS} = 50 V, f = 1 MHz, V _{GS} = 0	-	1630 750 30	-	pF pF pF
C _{oss eq.} ⁽²⁾	Equivalent output capacitance	V _{GS} = 0, V _{DS} = 0 to 480 V	-	TBD	-	pF
R _G	Gate input resistance	f = 1 MHz Gate DC Bias = 0 Test Signal Level = 20 mV Open Drain	-	2.7	-	Ω
Q _g Q _{gs} Q _{gd}	Total gate charge Gate-source charge Gate-drain charge	V _{DD} = 640 V, I _D = 17 A V _{GS} = 10 V <i>Figure 3</i>	-	TBD TBD TBD	-	nC nC nC

1. Pulsed: pulse duration = 300μs, duty cycle 1.5%
2. C_{oss eq.} is defined as a constant equivalent capacitance giving the same charging time as C_{oss} when V_{DS} increases from 0 to 80% V_{DSS}

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 400\text{ V}$, $I_D = 8.5\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ <i>Figure 2, Figure 7</i>	-	TBD	-	ns
t_r	Rise time			TBD		ns
$t_{d(off)}$	Turn-off delay time			TBD		ns
t_f	Fall time			TBD		ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		7	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				28	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 17\text{ A}$, $V_{GS} = 0$	-		TBD	V
t_{rr}	Reverse recovery time	$I_{SD} = 17\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 50\text{ V}$, <i>Figure 4</i>	-	TBD		ns
Q_{rr}	Reverse recovery charge			TBD		μC
I_{RRM}	Reverse recovery current			TBD		A
t_{rr}	Reverse recovery time	$I_{SD} = 17\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 50\text{ V}$, $T_j = 150^\circ\text{C}$ <i>Figure 4</i>	-	TBD		ns
Q_{rr}	Reverse recovery charge			TBD		μC
I_{RRM}	Reverse recovery current			TBD		A

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

3 Test circuits

Figure 2. Switching times test circuit for resistive load

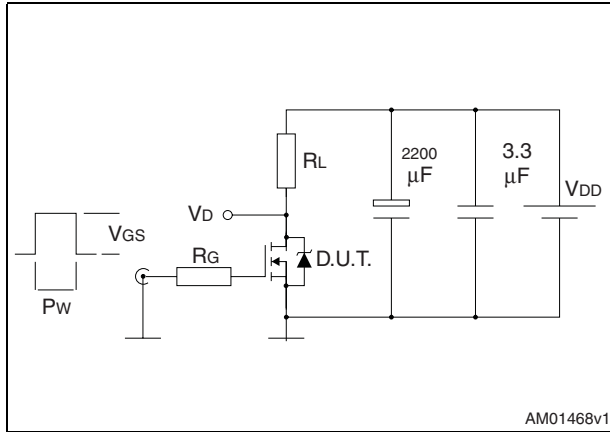


Figure 3. Gate charge test circuit

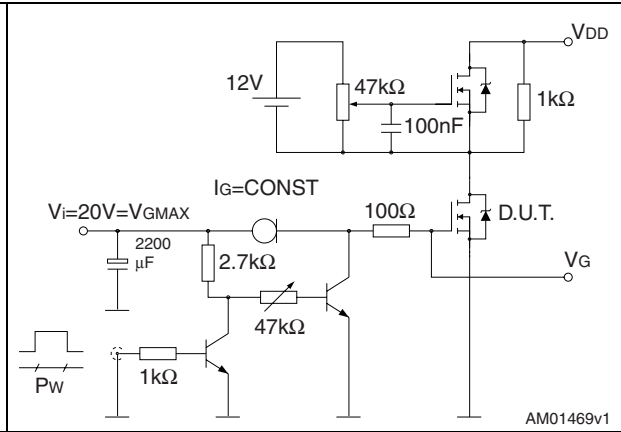


Figure 4. Test circuit for inductive load switching and diode recovery times

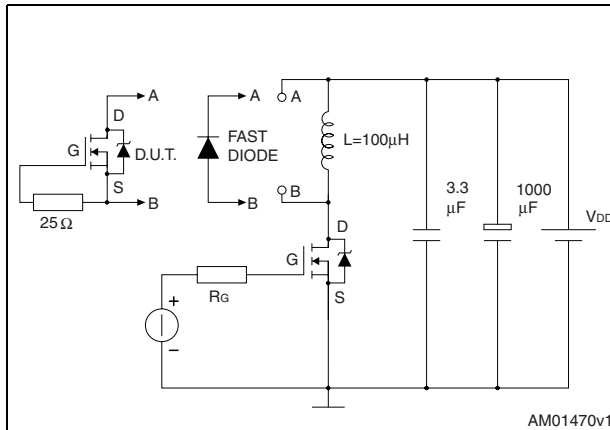


Figure 5. Unclamped inductive load test circuit

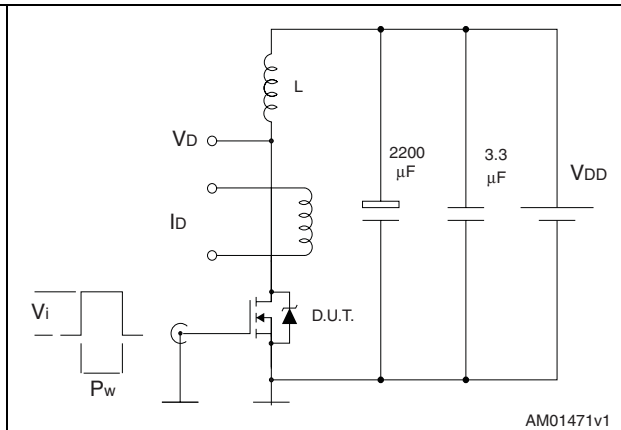


Figure 6. Unclamped inductive waveform

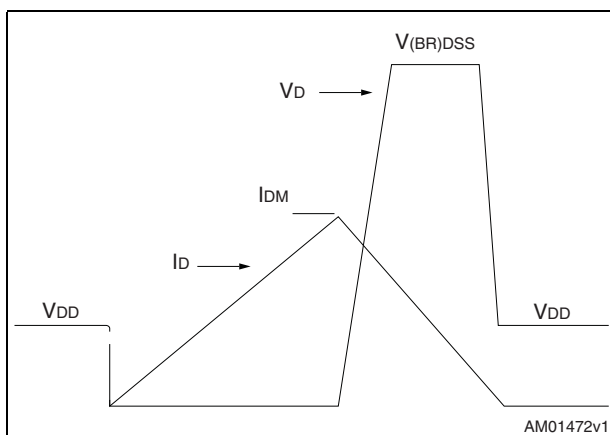
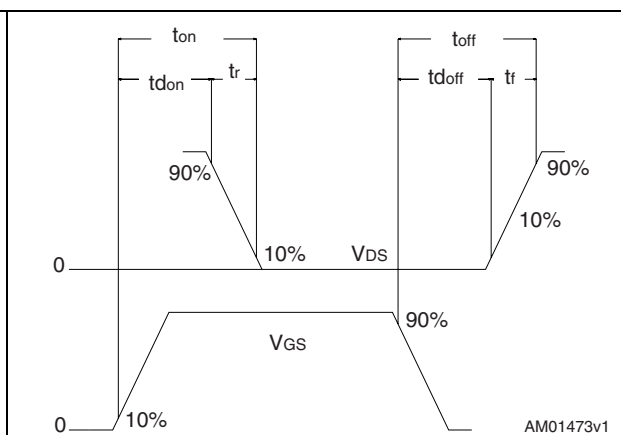


Figure 7. Switching time waveform

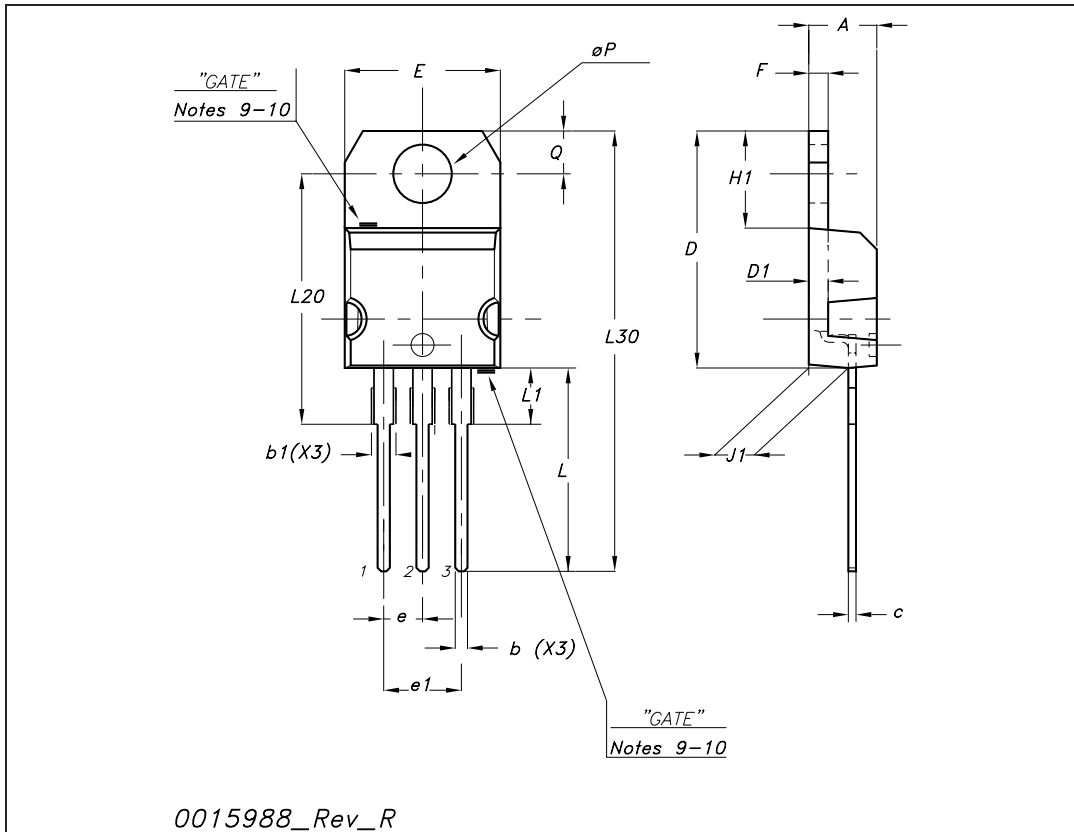


4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK[®] packages, depending on their level of environmental compliance. ECOPACK[®] specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

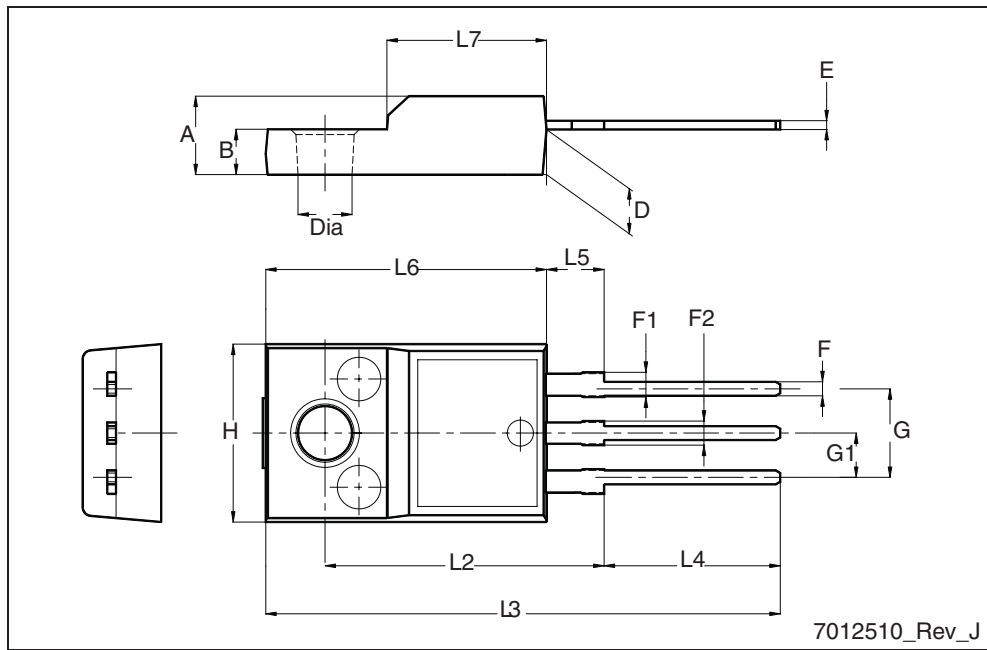
TO-220 mechanical data

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	1.14		1.70	0.044		0.066
c	0.48		0.70	0.019		0.027
D	15.25		15.75	0.6		0.62
D1		1.27			0.050	
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		0.051
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	
∅P	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



TO-220FP mechanical data

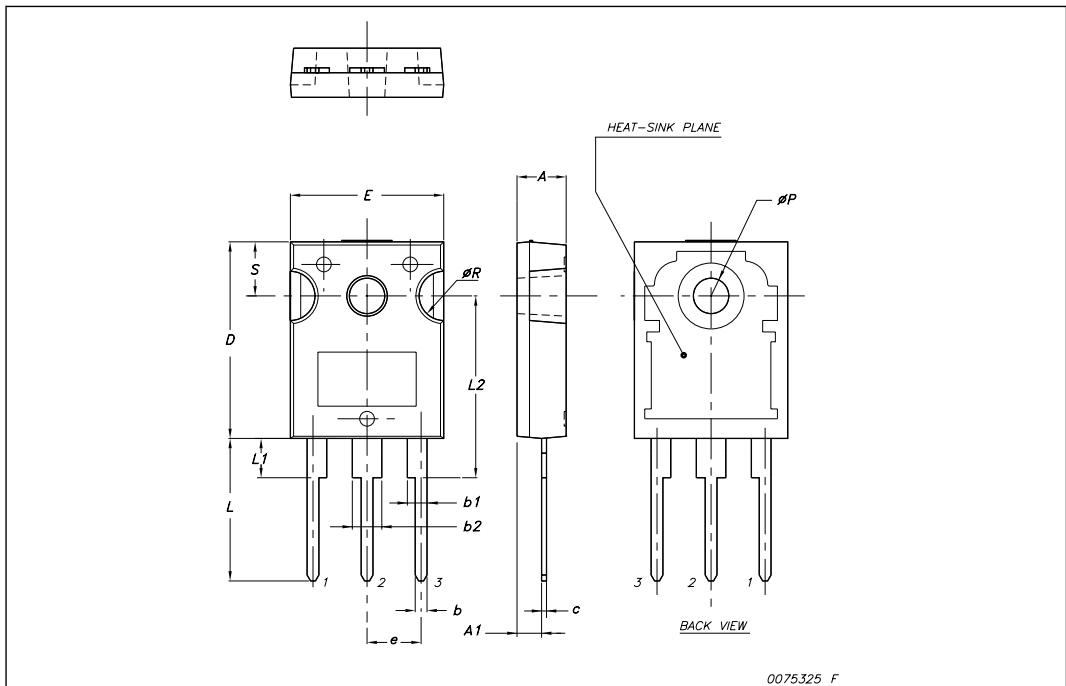
Dim.	mm		
	Min.	Typ.	Max.
A	4.4		4.6
B	2.5		2.7
D	2.5		2.75
E	0.45		0.7
F	0.75		1
F1	1.15		1.70
F2	1.15		1.5
G	4.95		5.2
G1	2.4		2.7
H	10		10.4
L2		16	
L3	28.6		30.6
L4	9.8		10.6
L5	2.9		3.6
L6	15.9		16.4
L7	9		9.3
Dia	3		3.2



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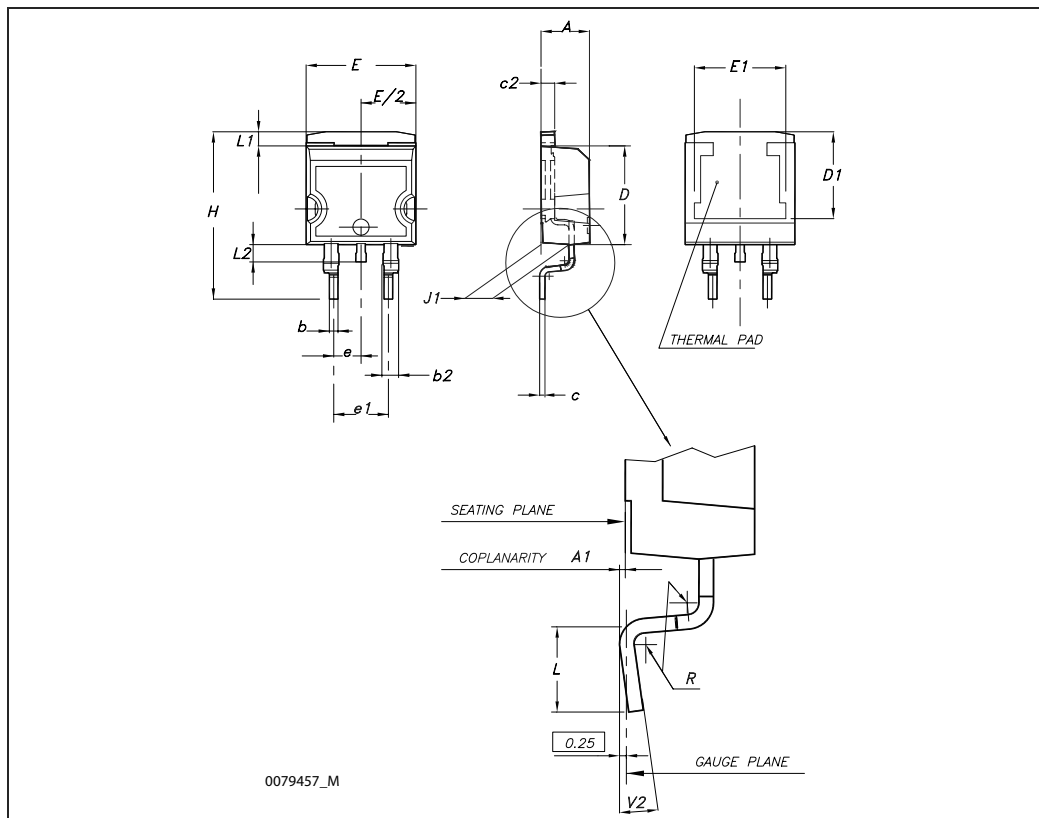
TO-247 Mechanical data

Dim.	mm.		
	Min.	Typ	Max.
A	4.85		5.15
A1	2.20		2.60
b	1.0		1.40
b1	2.0		2.40
b2	3.0		3.40
c	0.40		0.80
D	19.85		20.15
E	15.45		15.75
e		5.45	
L	14.20		14.80
L1	3.70		4.30
L2		18.50	
øP	3.55		3.65
øR	4.50		5.50
S		5.50	



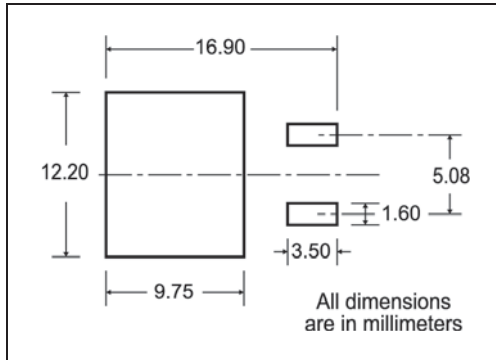
D²PAK (TO-263) mechanical data

Dim	mm			inch		
	Min	Typ	Max	Min	Typ	Max
A	4.40		4.60	0.173		0.181
A1	0.03		0.23	0.001		0.009
b	0.70		0.93	0.027		0.037
b2	1.14		1.70	0.045		0.067
c	0.45		0.60	0.017		0.024
c2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1	7.50			0.295		
E	10		10.40	0.394		0.409
E1	8.50			0.334		
e		2.54			0.1	
e1	4.88		5.28	0.192		0.208
H	15		15.85	0.590		0.624
J1	2.49		2.69	0.099		0.106
L	2.29		2.79	0.090		0.110
L1	1.27		1.40	0.05		0.055
L2	1.30		1.75	0.051		0.069
R		0.4			0.016	
V2	0°		8°	0°		8°



5 Packaging mechanical data

D²PAK FOOTPRINT



TAPE AND REEL SHIPMENT

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	BULK QTY
1000	1000

6 Revision history

Table 9. Document revision history

Date	Revision	Changes
25-Feb-2009	1	First release
07-Apr-2009	2	<i>Section 4: Package mechanical data</i> has been modified
20-Apr-2009	3	$R_{DS(on)}$ max value has been corrected

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