



STB20PF75

P-CHANNEL 75V - 0.10 Ω - 20A D²PAK STripFET™ II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB20PF75	75 V	< 0.12 Ω	20 A

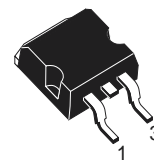
- TYPICAL R_{DS(on)} = 0.10 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION

DESCRIPTION

This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

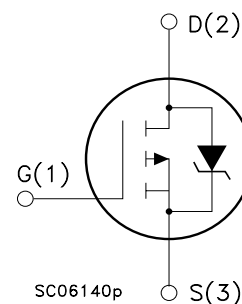
- MOTOR CONTROL
- DC-DC & DC-AC CONVERTERS



**D²PAK
TO-263**
(Suffix "T4")

ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	75	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 k Ω)	75	V
V _{GS}	Gate- source Voltage	± 20	V
I _D	Drain Current (continuous) at T _C = 25°C	20	A
I _D	Drain Current (continuous) at T _C = 100°C	14	A
I _{DM} (*)	Drain Current (pulsed)	80	A
P _{tot}	Total Dissipation at T _C = 25°C	80	W
	Derating Factor	0.53	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	10	V/ns
E _{AS} (2)	Single Pulse Avalanche Energy	350	mJ
T _{stg}	Storage Temperature	-55 to 175	°C
T _j	Operating Junction Temperature		

(*) Pulse width limited by safe operating area

(1) I_{SD} \leq 20A, di/dt \leq 200A/ μ s, V_{DD} \leq V_{(BR)DSS}, T_j \leq T_{JMAX}

(2) Starting T_j = 25 °C, I_D = 10 A, V_{DD} = 30V

Note: For the P-CHANNEL MOSFET actual polarity of voltages and current has to be reversed

STB20PF75**THERMAL DATA**

Rthj-case	Thermal Resistance Junction-case	Max	1.88	°C/W
Rthj-PCB	Thermal Resistance Junction-PCB	Max	34	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose (1.6 mm from case, for 10 sec)	Typ	300	°C

(*) When Mounted on 1 inch² FR-4 board, 2 oz of Cu**ELECTRICAL CHARACTERISTICS** (T_{case} = 25 °C unless otherwise specified)**OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0	75			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating T _C = 125°C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 20 V			±100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} I _D = 250 μA	2	3	4	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V I _D = 10 A		0.10	0.12	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{DS} = 15 V I _D = 10 A		15		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		1150		pF
C _{oss}	Output Capacitance			170		pF
C _{rss}	Reverse Transfer Capacitance			70		pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{DD} = 37.5\text{ V}$ $I_D = 10\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 1)		20 51		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD}=60\text{V}$ $I_D=20\text{A}$ $V_{GS}=10\text{V}$ (See test circuit, Figure 2)		38 7 10	52	nC nC nC

SWITCHING OFF (*)

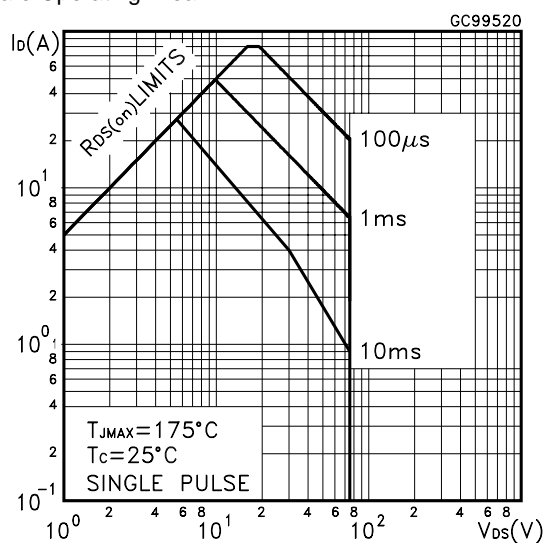
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 60\text{ V}$ $I_D = 10\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 1)		40 13		ns ns

SOURCE DRAIN DIODE (*)

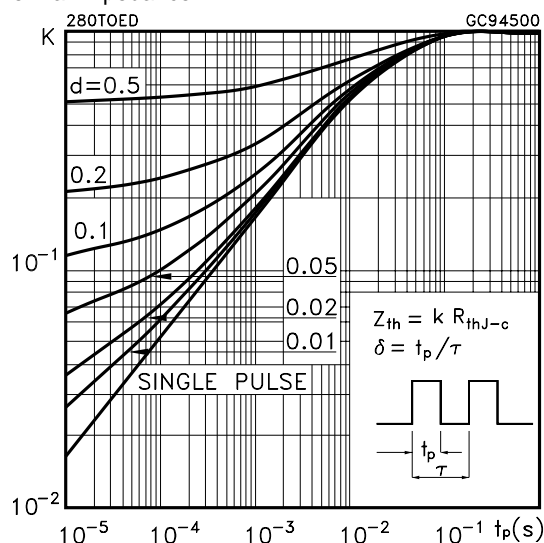
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (*)	Source-drain Current Source-drain Current (pulsed)				20 80	A A
V_{SD} (*)	Forward On Voltage	$I_{SD} = 20\text{ A}$ $V_{GS} = 0$			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 20\text{ A}$ $di/dt = 100\text{A}/\mu\text{s}$ $V_{DD} = 25\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 3)		80 250 6.2		ns nC A

(*) Pulse width $\leq 300\ \mu\text{s}$, duty cycle 1.5 %.(*) Pulse width limited by T_{JMAX}

Safe Operating Area

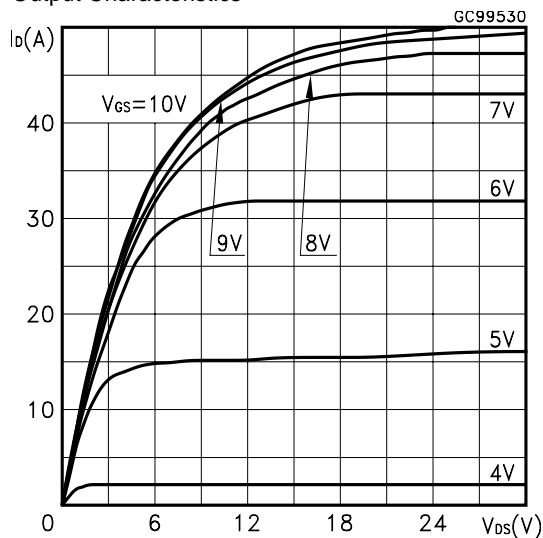


Thermal Impedance

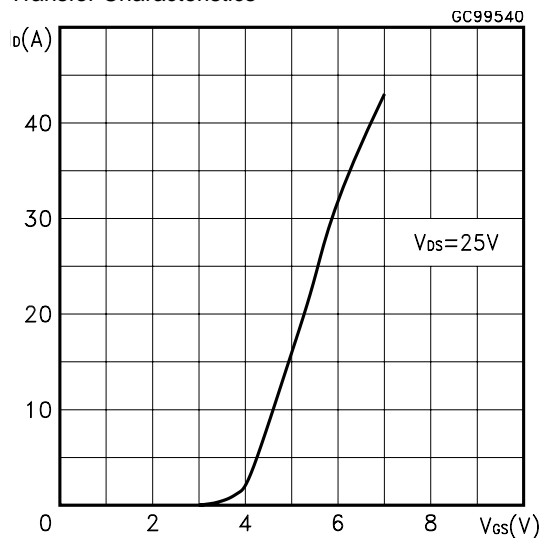


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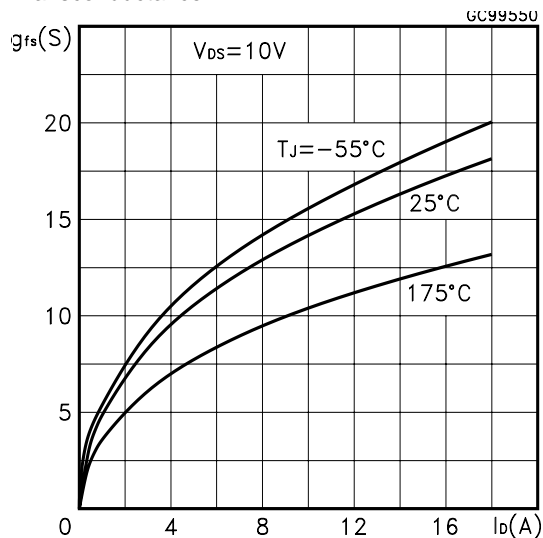
Output Characteristics



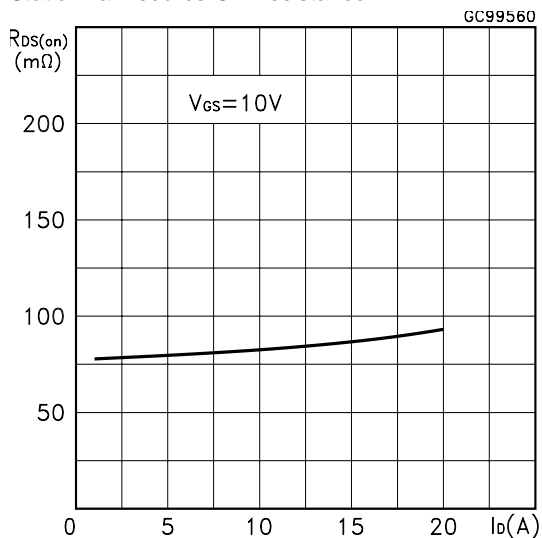
Transfer Characteristics



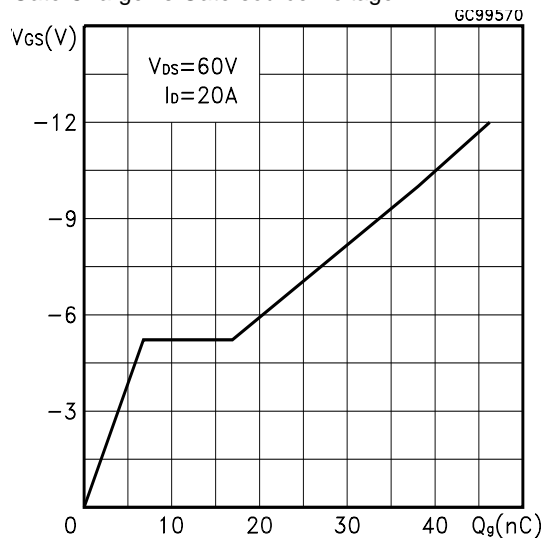
Transconductance



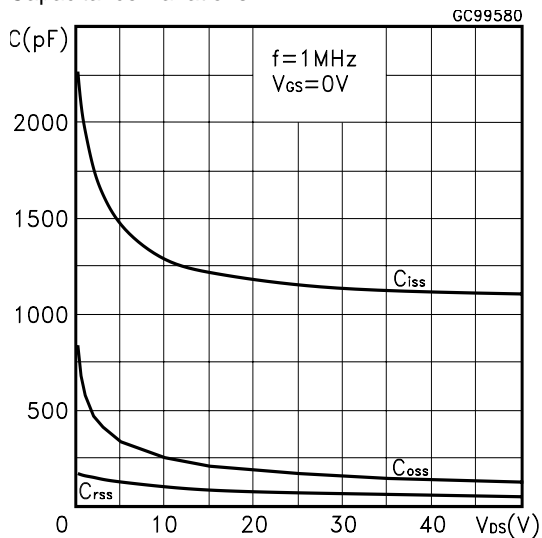
Static Drain-source On Resistance



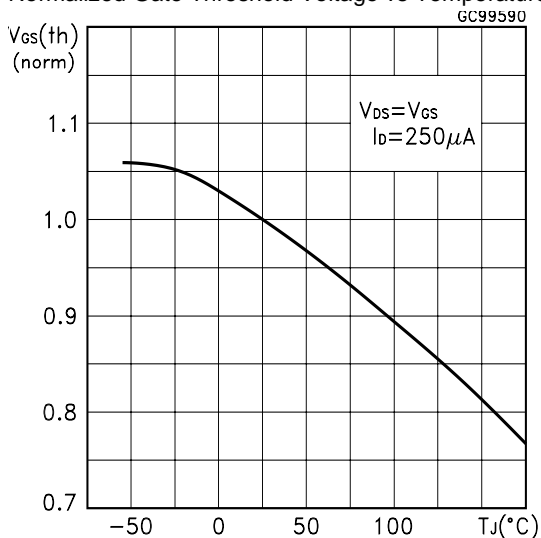
Gate Charge vs Gate-source Voltage



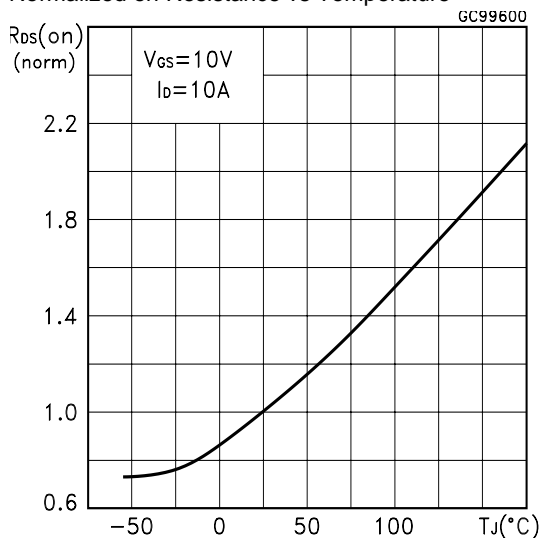
Capacitance Variations



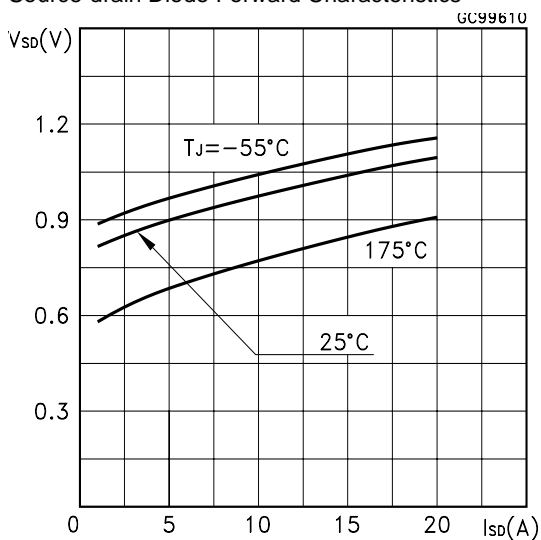
Normalized Gate Threshold Voltage vs Temperature



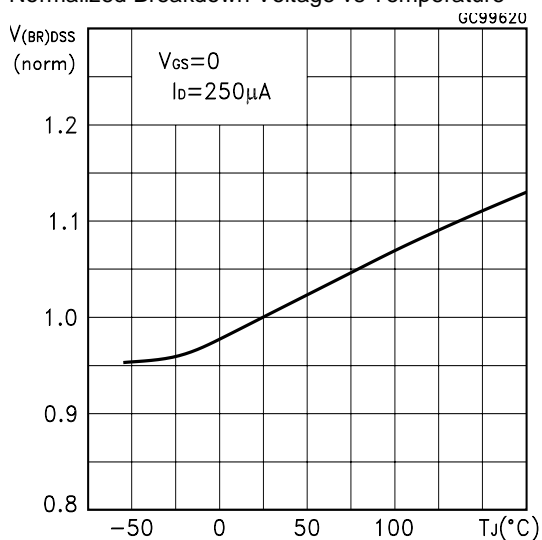
Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature



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Fig. 1: Switching Times Test Circuits For Resistive Load

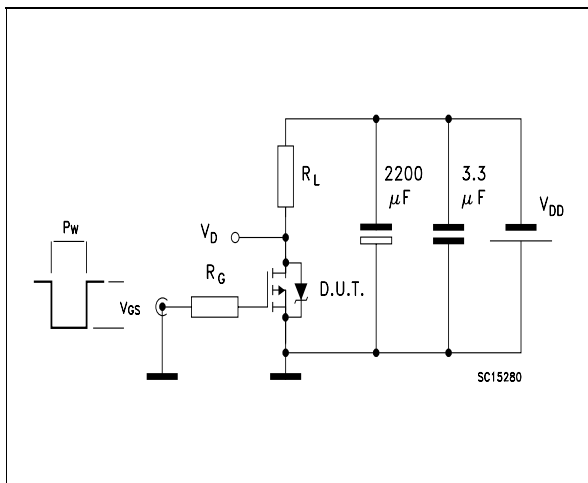


Fig. 2: Gate Charge test Circuit

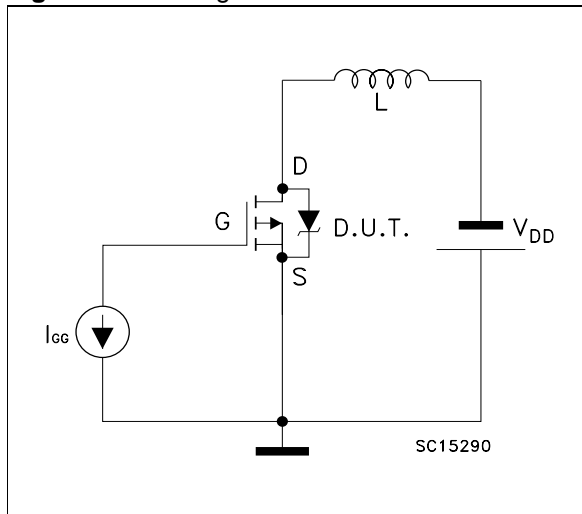
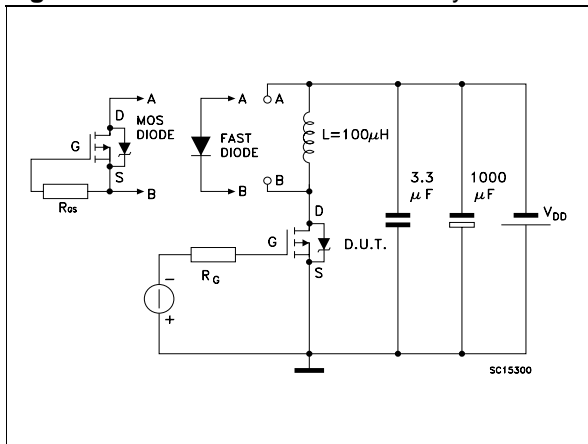
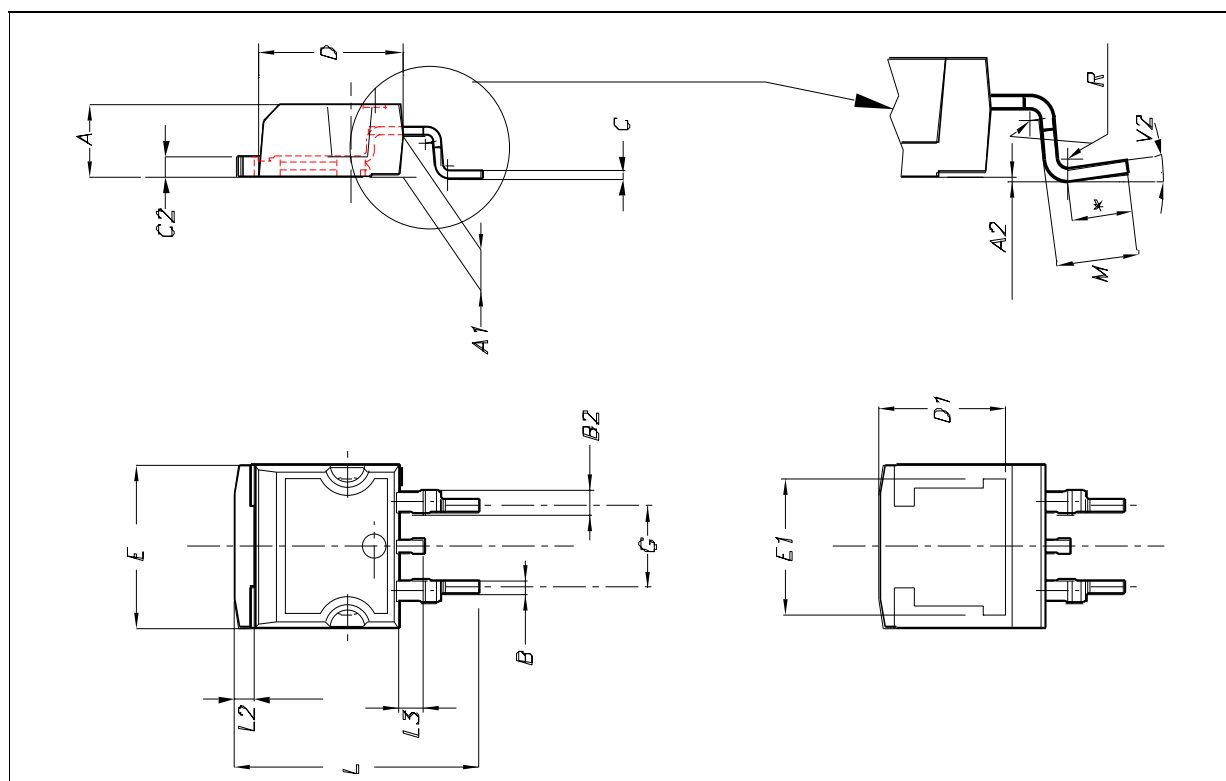


Fig. 3: Test Circuit For Diode Recovery Behaviour



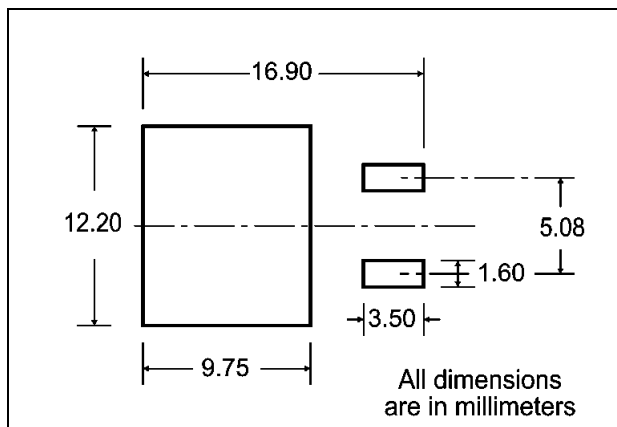
D²PAK MECHANICAL DATA

DIM.	mm.			inch.		
	MIN.	TYP.	MAX.	MIN.	TYP.	TYP.
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	0.028		0.037
B2	1.14		1.7	0.045		0.067
C	0.45		0.6	0.018		0.024
C2	1.21		1.36	0.048		0.054
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.394		0.409
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.591		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.069
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0°		8°	0°		8°

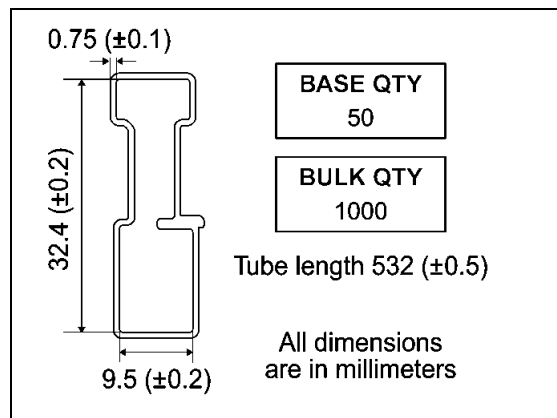


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D2PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

Diagram showing the tape and reel shipment details. The top diagram is a circular reel with diameter A, showing a central hub with diameter D and a full radius. A tape slot is shown in the core for tape start, with a width of 2.5 mm min. and a length of 40 mm min. The distance from the center of the reel to the center of the tape slot is B. The distance from the center of the reel to the center of the hub is N. The distance from the center of the reel to the center of the tape slot is C. The distance from the center of the reel to the center of the hub is G, measured at the hub. The distance from the center of the reel to the center of the tape slot is T.

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

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

Diagram showing the tape mechanical data. The top diagram is a cross-section of the tape showing the top cover tape, the cavity, and the center line of the cavity. The distance from the center line of the cavity to the center of the hub is D. The distance from the center line of the cavity to the center of the hub is P₂. The distance from the center line of the cavity to the center of the hub is P₀. The distance from the center line of the cavity to the center of the hub is E. The distance from the center line of the cavity to the center of the hub is F. The distance from the center line of the cavity to the center of the hub is W. The distance from the center line of the cavity to the center of the hub is K₀. The distance from the center line of the cavity to the center of the hub is T. The distance from the center line of the cavity to the center of the hub is B₀. The distance from the center line of the cavity to the center of the hub is D₁. The distance from the center line of the cavity to the center of the hub is A₀. The distance from the center line of the cavity to the center of the hub is P₁. The distance from the center line of the cavity to the center of the hub is R min. The distance from the center line of the cavity to the center of the hub is Bending radius. The distance from the center line of the cavity to the center of the hub is FEED DIRECTION. The distance from the center line of the cavity to the center of the hub is User Direction of Feed. The distance from the center line of the cavity to the center of the hub is TRL. The distance from the center line of the cavity to the center of the hub is 10 pitches cumulative tolerance on tape +/- 0.2 mm.

* on sales type



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