



STB45NF06

N-CHANNEL 60V - 0.022Ω - 38A D²PAK

STripFET™ II MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB45NF06	60V	<0.028Ω	38A

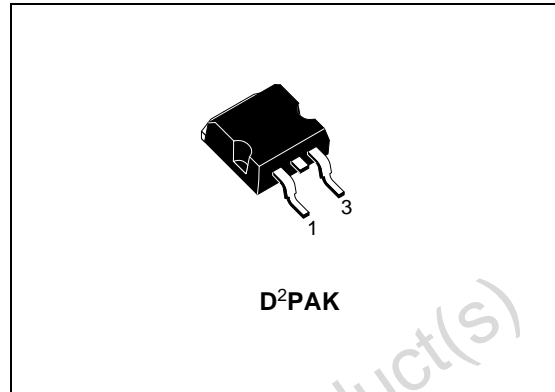
- TYPICAL R_{DS(on)} = 0.022Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- STANDARD THRESHOLD DRIVE

DESCRIPTION

This 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.

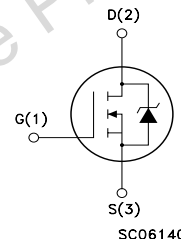
APPLICATIONS

- HIGH-EFFICIENCY DC-DC CONVERTERS
- SOLENOID AND RELAY DRIVERS
- DC-DC & DC-AC CONVERTERS



D²PAK

INTERNAL SCHEMATIC DIAGRAM



ORDER CODES

PART NUMBER	MARKING	PACKAGE	PACKAGING
STB45NF06T4	B45NF06	D ² PAK	TAPE & REEL

STB45NF06

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	60	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	60	V
V _{GS}	Gate- source Voltage	±20	V
I _D	Drain Current (continuous) at T _C = 25°C	38	A
I _D	Drain Current (continuous) at T _C = 100°C	26	A
I _{DM} (●)	Drain Current (pulsed)	152	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	7	V/ns
T _{stg}	Storage Temperature	-65 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(●) Pulse width limited by safe operating area

(1) I_{SD} ≤ 38A, di/dt ≤ 300A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case Max	1.87	°C/W
R _{thj-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)	38	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	135	mJ

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	60			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} = ±20V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2	3	4	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V, I _D = 19 A		0.022	0.028	Ω

ELECTRICAL CHARACTERISTICS (CONTINUED)

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, $I_D = 19\text{ A}$		24		S
C_{iss}	Input Capacitance	$V_{DS} = 25\text{V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		1730		pF
C_{oss}	Output Capacitance			215		pF
C_{rss}	Reverse Transfer Capacitance			63		pF

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 30\text{V}$, $I_D = 19\text{A}$ $R_G = 4.7\Omega$, $V_{GS} = 10\text{V}$ (see test circuit, Figure 3)		20		ns
t_r	Rise Time			100		ns
Q_g	Total Gate Charge	$V_{DD} = 48\text{V}$, $I_D = 38\text{A}$, $V_{GS} = 10\text{V}$		43	58	nC
Q_{gs}	Gate-Source Charge			9		nC
Q_{gd}	Gate-Drain Charge			15		nC

SWITCHING OFF

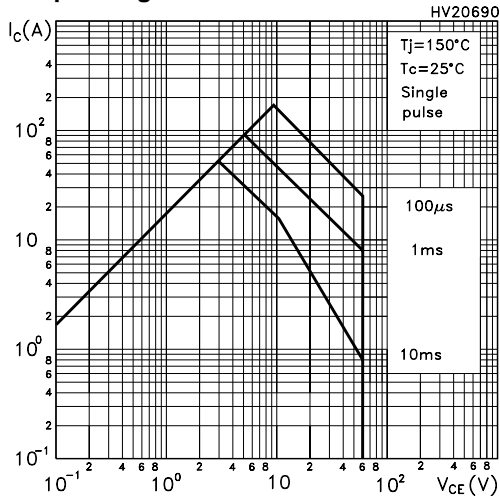
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 30\text{V}$, $I_D = 19\text{A}$, $R_G = 4.7\Omega$, $V_{GS} = 10\text{V}$ (see test circuit, Figure 3)		50		ns
t_f	Fall Time			20		ns
$t_{d(off)}$	Off-voltage Rise Time	$V_{clamp} = 48\text{V}$, $I_D = 38\text{A}$ $R_G = 4.7\Omega$, $V_{GS} = 10\text{V}$ (see test circuit, Figure 5)		45		ns
t_f	Fall Time			42		ns
t_c	Cross-over Time			60		ns

SOURCE DRAIN DIODE

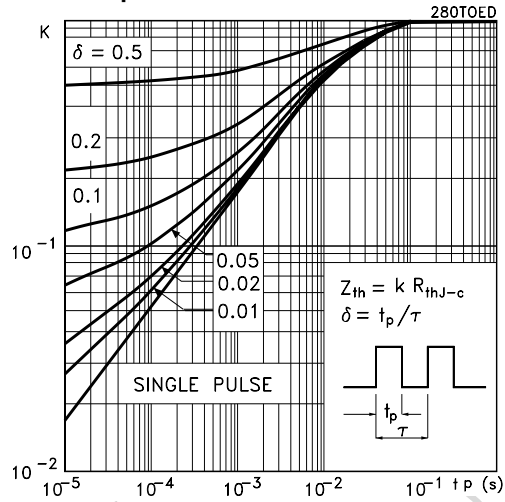
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				38	A
I_{SDM} (1)	Source-drain Current (pulsed)				152	A
V_{SD} (2)	Forward On Voltage	$I_{SD} = 38\text{A}$, $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 38\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$, $V_{DD} = 100\text{V}$, $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		95		ns
Q_{rr}	Reverse Recovery Charge			260		nC
I_{RRM}	Reverse Recovery Current			5.5		A

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

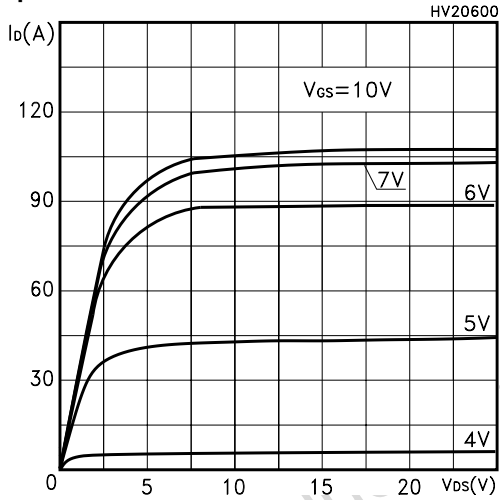
Safe Operating Area



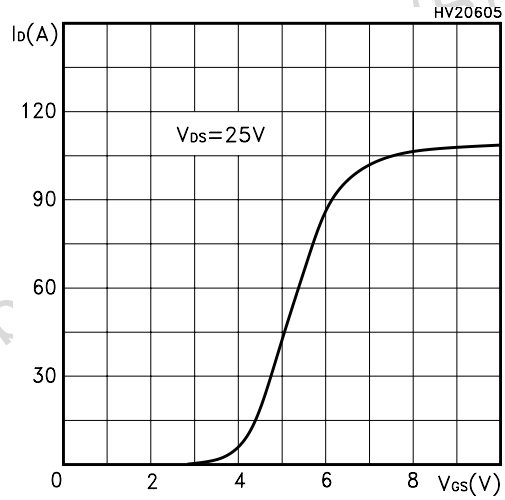
Thermal Impedance



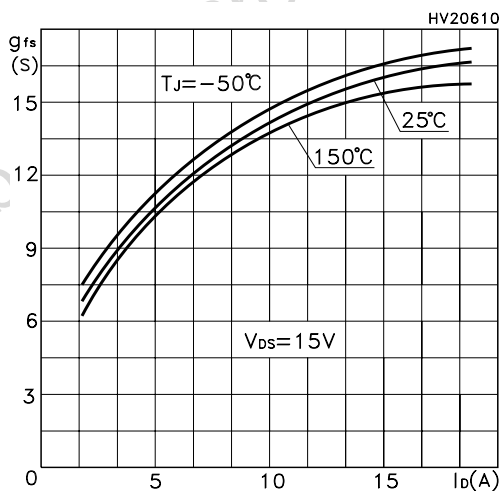
Output Characteristics



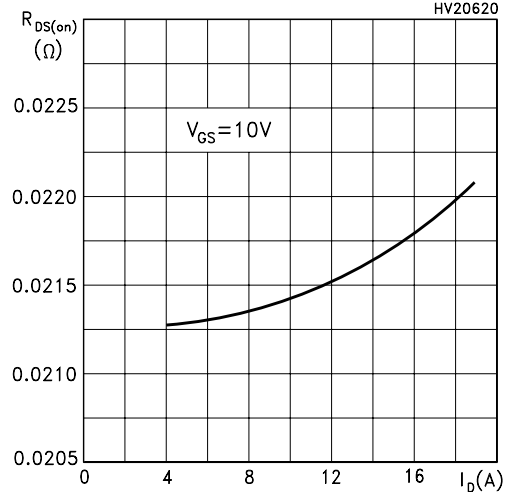
Transfer Characteristics



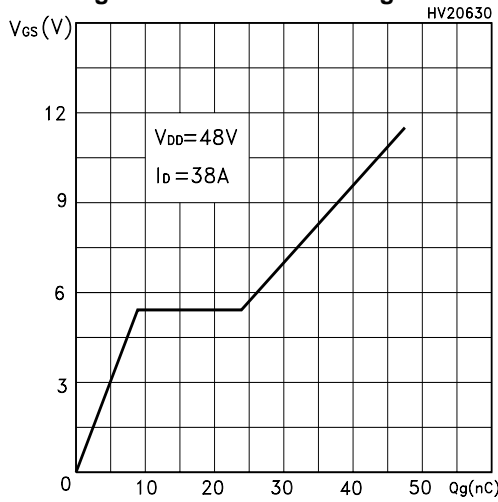
Transconductance



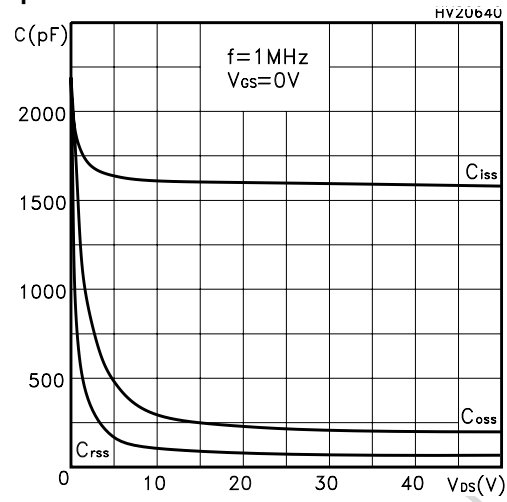
Static Drain-source On Resistance



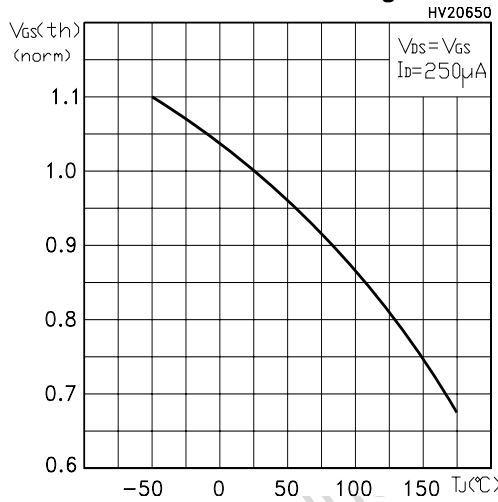
Gate Charge vs Gate-source Voltage



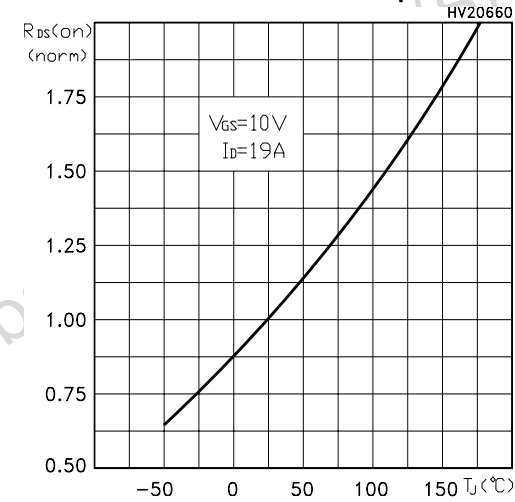
Capacitance Variations



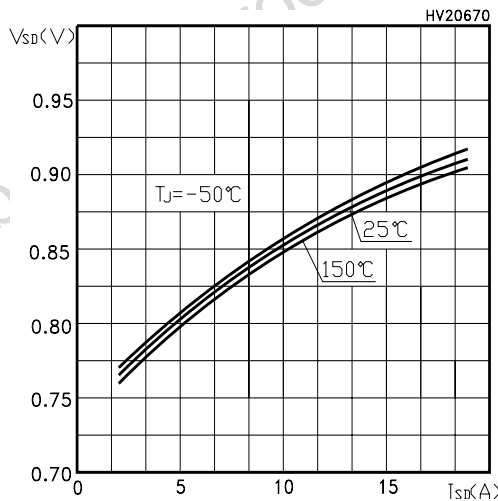
Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized BVDSS vs Temperature

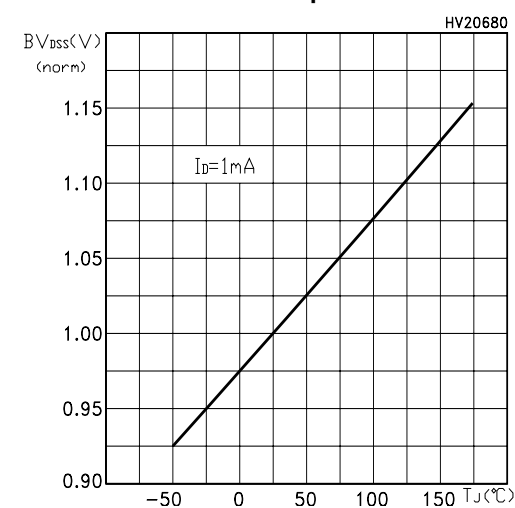


Fig. 1: Unclamped Inductive Load Test Circuit

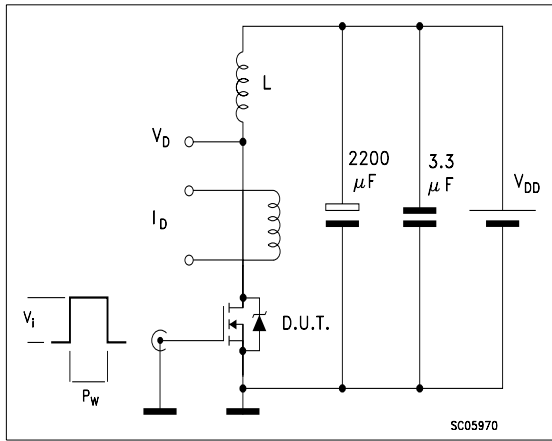


Fig. 2: Unclamped Inductive Waveform

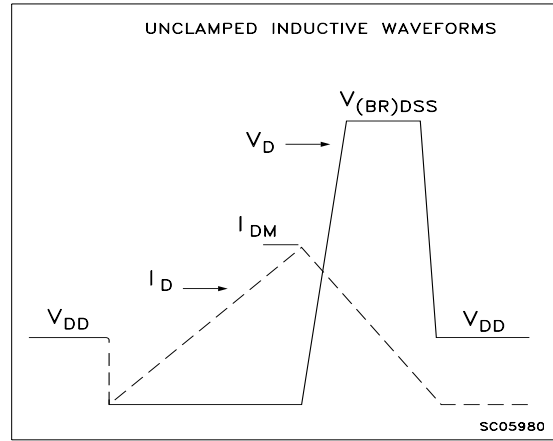


Fig. 3: Switching Times Test Circuit For Resistive Load

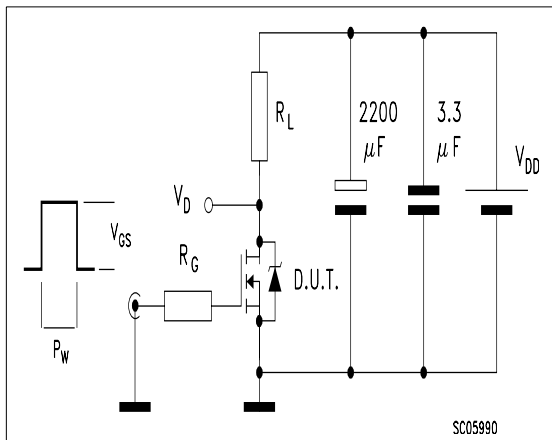


Fig. 4: Gate Charge test Circuit

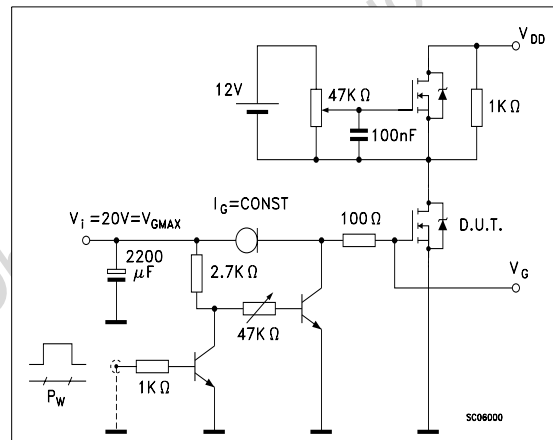
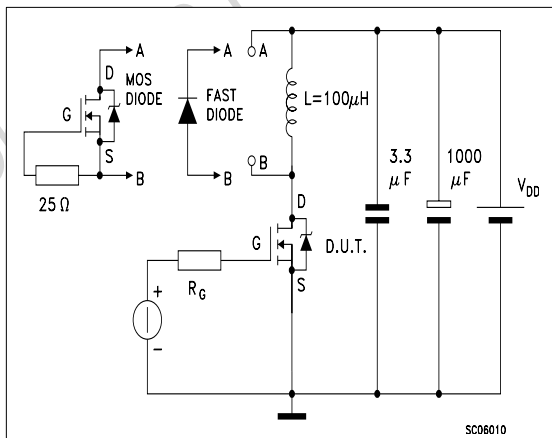
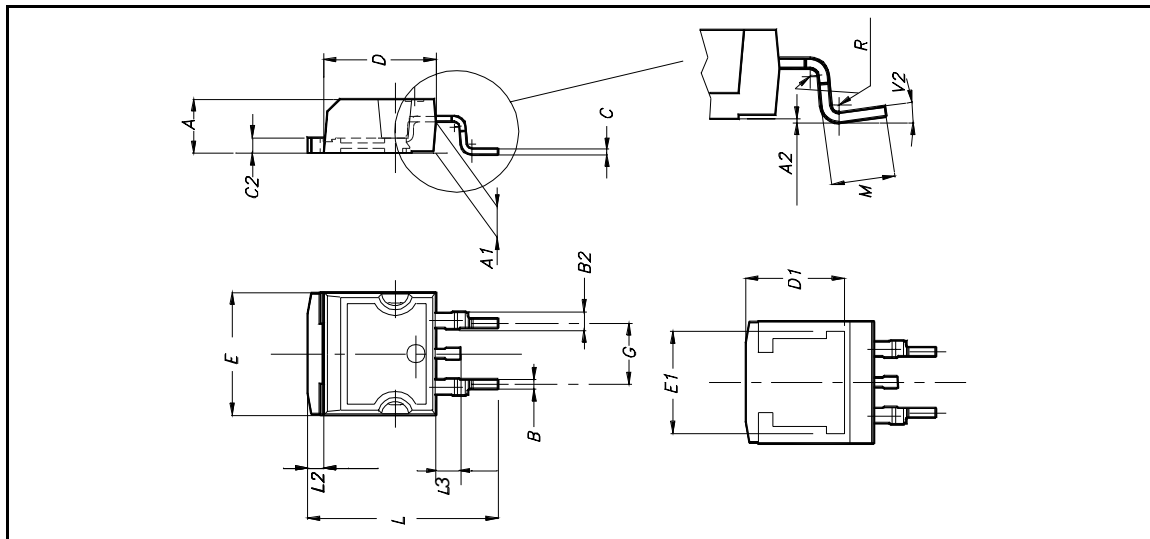


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

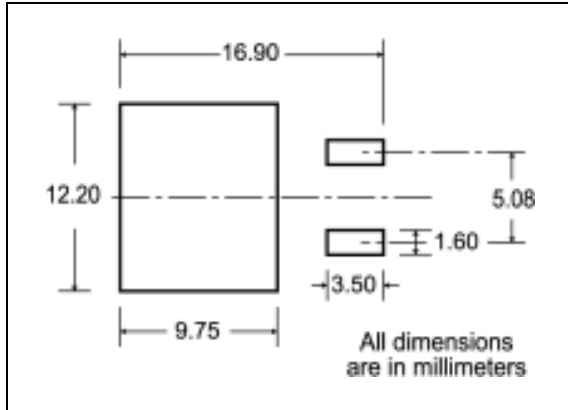


D²PAK MECHANICAL DATA

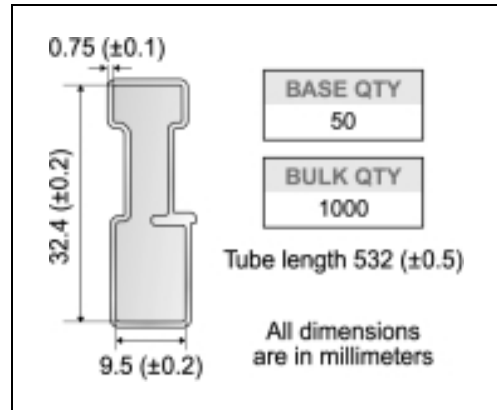
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
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°			



D²PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

Diagram showing the tape mechanical data. It includes a top view of the tape with dimensions A, B, C, D, and a full radius. A 40 mm min. access hole is shown at the slot location. A tape slot in the core for tape start is shown with a 2.5 mm min. width. A side view shows dimensions T, C, N, and G (measured at hub).

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

Diagrams showing the tape and reel shipment. The top diagram shows a top view of the tape with dimensions A₀, B₀, C₀, D₀, E₀, F₀, G₀, H₀, I₀, J₀, K₀, L₀, M₀, N₀, O₀, P₀, Q₀, R₀, S₀, T₀, U₀, V₀, W₀, X₀, Y₀, Z₀. The bottom diagram shows a side view of the tape with dimensions A₁, B₁, C₁, D₁, E₁, F₁, G₁, H₁, I₁, J₁, K₁, L₁, M₁, N₁, O₁, P₁, Q₁, R₁, S₁, T₁, U₁, V₁, W₁, X₁, Y₁, Z₁. The bottom right diagram shows a bending radius R min. and a feed direction arrow.

* on sales type



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