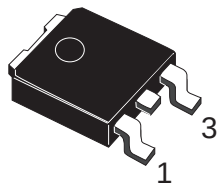
STD2NB50
STD2NB50-1

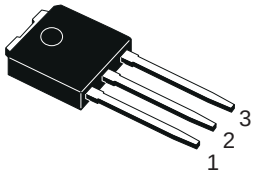
N-CHANNEL 500V - 5Ω - 1A DPAK / IPAK
PowerMesh™ MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STD2NB50	500V	< 6Ω	1 A
STD2NB50-1	500V	< 6Ω	1 A

- TYPICAL $R_{DS}(on)$ = 5 Ω
- 100% AVALANCHE TESTED
- VERY LOW INTRINSIC CAPACITANCES
- ADD SUFFIX “T4” FOR ORDERING IN TAPE & REEL



DPAK

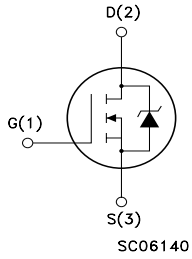


IPAK

DESCRIPTION

Using the latest high voltage MESH OVERLAY™ process, STMicroelectronics has designed an advanced family of power MOSFETs with outstanding performances. The new patent pending strip layout coupled with the Company’s proprieraty edge termination structure, gives the lowest RDS(on) per area, exceptional avalanche and dv/dt capabilities and unrivalled gate charge and switching characteristics.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- SWITH MODE POWER SUPPLIES (SMPS)
- LIGHTING FOR INDUSTRIAL AND CONSUMER ENVIRONMENT

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	500	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	500	V
V_{GS}	Gate- source Voltage	± 30	V
I_D	Drain Current (continuos) at T_C = 25°C	1	A
I_D	Drain Current (continuos) at T_C = 100°C	0.63	A
I_{DM} (•)	Drain Current (pulsed)	4	A
P_{TOT}	Total Dissipation at T_C = 25°C	40	W
	Derating Factor	0.32	W/°C
dv/dt(1)	Peak Diode Recovery voltage slope	3.5	V/ns
T_{stg}	Storage Temperature	–65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(•)Pulse width limited by safe operating area

(1)I_{SD} ≤1A, di/dt ≤200A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ $T_{JMAX.}$

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	3.125	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose	275	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	1	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, $I_D = I_{AR}$, V_{DD} = 50 V)	40	mJ

ELECTRICAL CHARACTERISTICS (TCASE = 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	500			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating			1	µA
		V_{DS} = Max Rating, T_C = 125 °C			50	µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ±30V			±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	3	3.7	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V, I_D = 0.5 A		5	6	Ω

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 = 0.5 A		0.75		S
C_{iss}	Input Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		185		pF
C_{oss}	Output Capacitance			35		pF
C_{rss}	Reverse Transfer Capacitance			4		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{DD} = 200V, I_D = 0.5A		20		ns
t_r	Rise Time	R_G = 4.7Ω V_{GS} = 10V (see test circuit, Figure 3)		24		ns
Q_g	Total Gate Charge	V_{DD} = 4000V, I_D = 1A,		7	10	nC
Q_{gs}	Gate-Source Charge	V_{GS} = 10V		2.5		nC
Q_{gd}	Gate-Drain Charge			3.5		nC

SWITCHING OFF

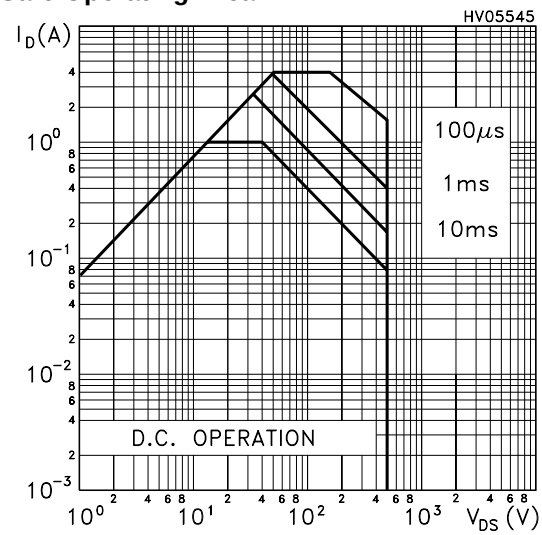
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	V_{DD} = 400V, I_D = 1 A,		20		ns
t_f	Fall Time	R_G = 4.7Ω, V_{GS} = 10V (see test circuit, Figure 5)		24		ns
t_c	Cross-over Time			30		ns

SOURCE DRAIN DIODE

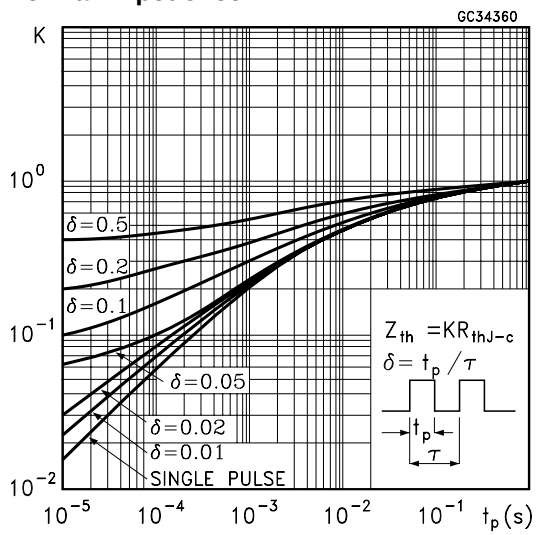
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				1	A
I_{SDM} (2)	Source-drain Current (pulsed)				4	A
V_{SD} (1)	Forward On Voltage	I_{SD} = 1A, V_{GS} = 0			1.5	V
t_{rr}	Reverse Recovery Time	I_{SD} = 1A, di/dt = 100A/µs,		330		ns
Q_{rr}	Reverse Recovery Charge	V_{DD} = 100V, T_j = 150°C (see test circuit, Figure 5)		780		µC
I_{RRM}	Reverse Recovery Current			4.7		A

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

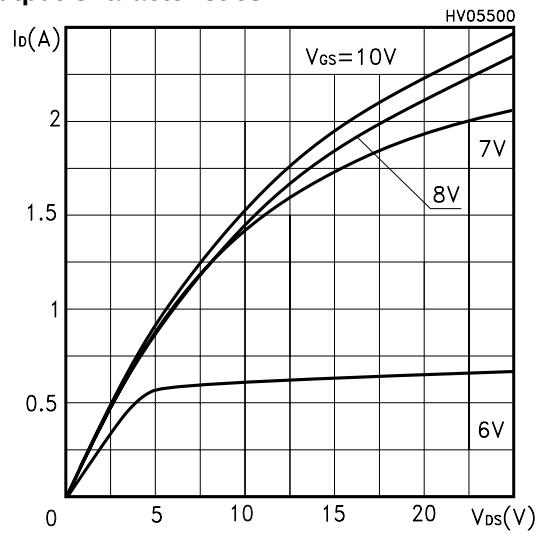
Safe Operating Area



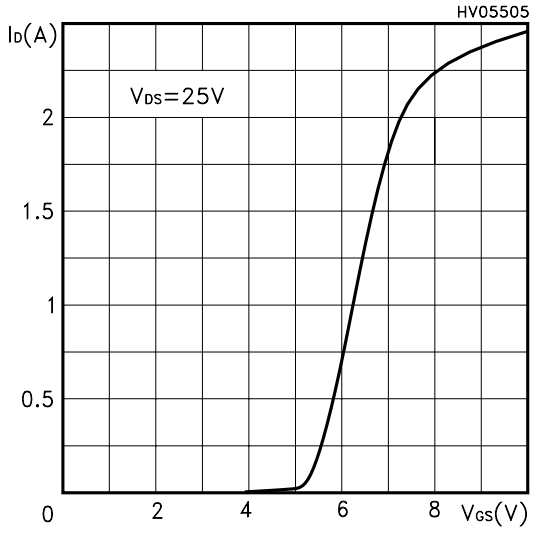
Thermal Impedence



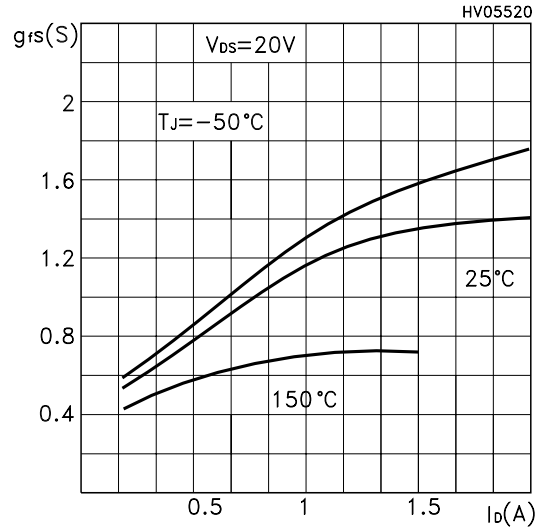
Output Characteristics



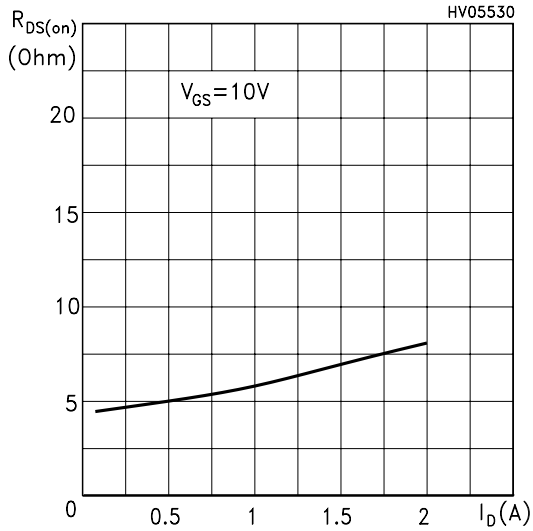
Transfer Characteristics



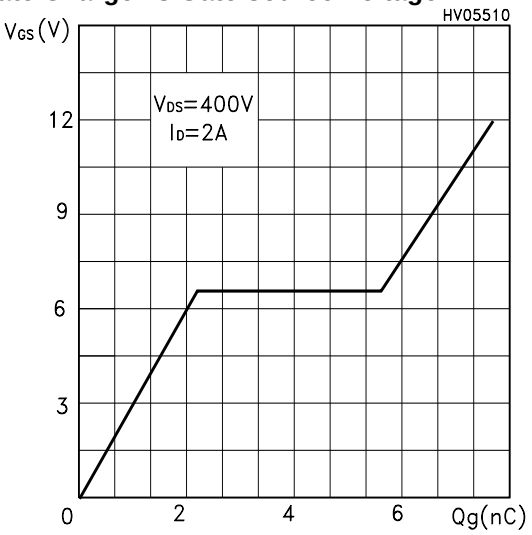
Transconductance



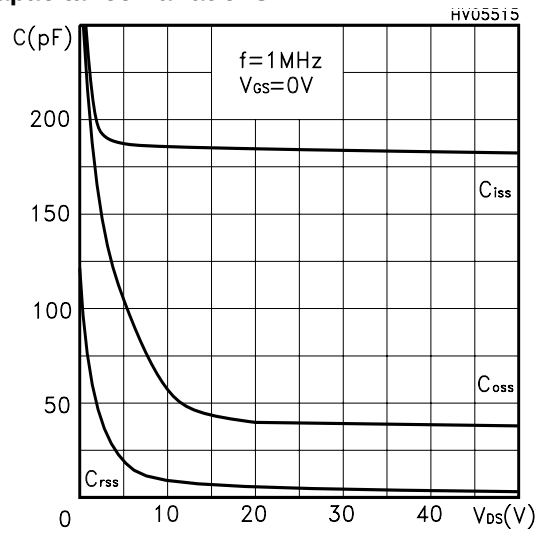
Static Drain-source On Resistance



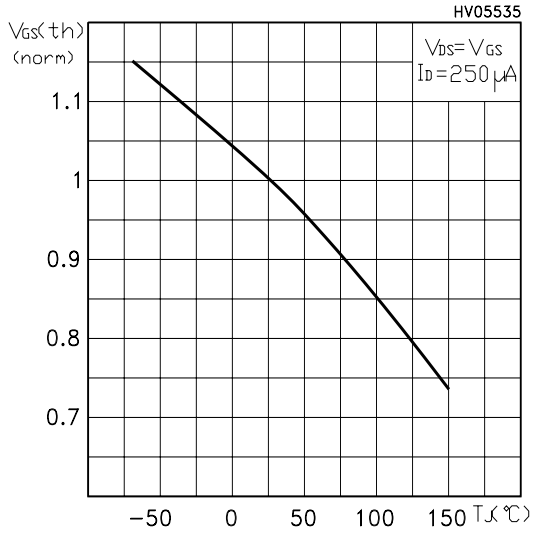
Gate Charge vs Gate-source Voltage



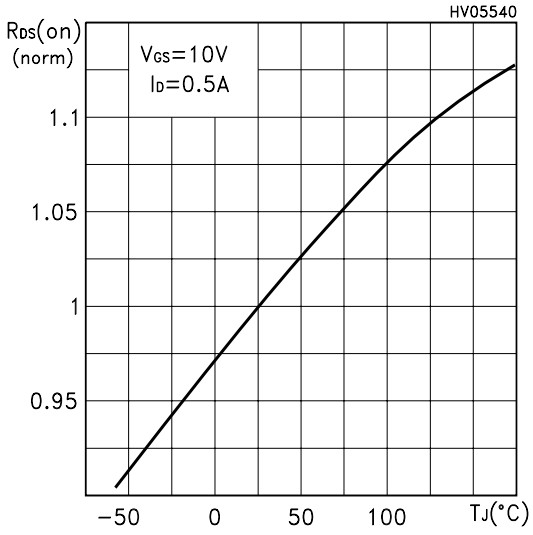
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

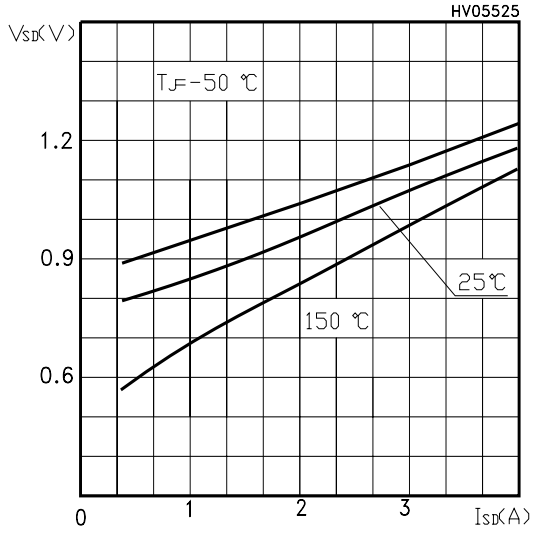


Fig. 1: Unclamped Inductive Load Test Circuit

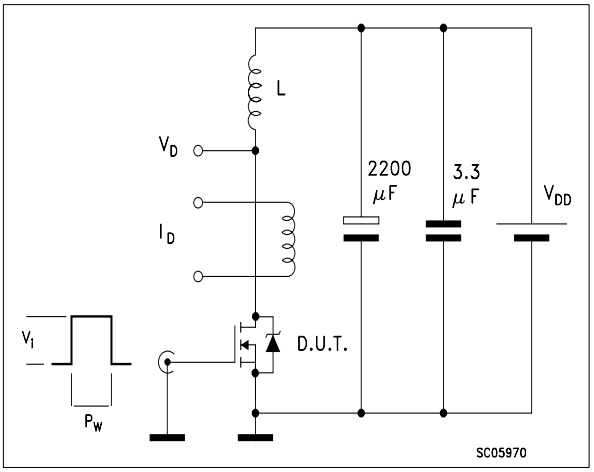


Fig. 2: Unclamped Inductive Waveform

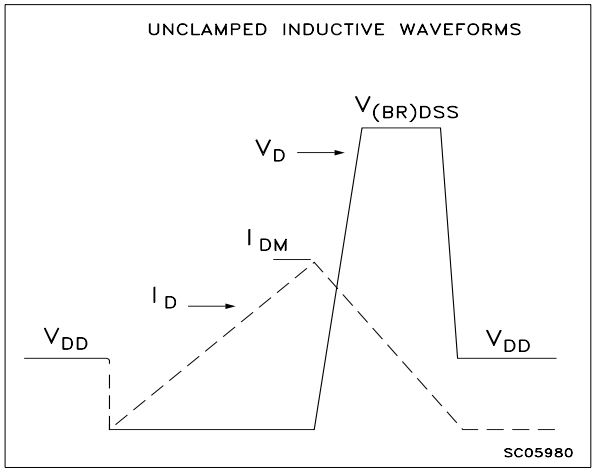


Fig. 3: Switching Times Test Circuits For Resistive Load

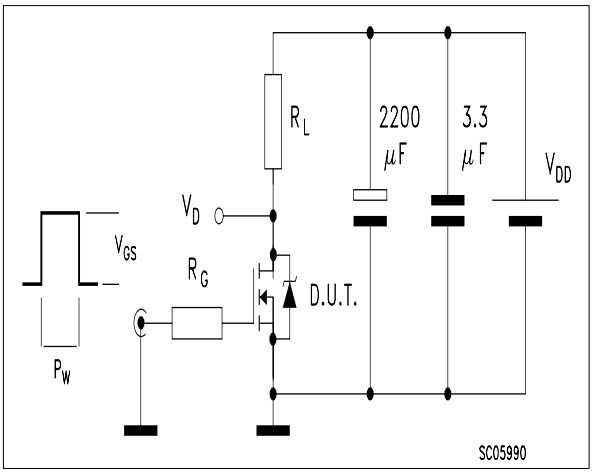


Fig. 4: Gate Charge test Circuit

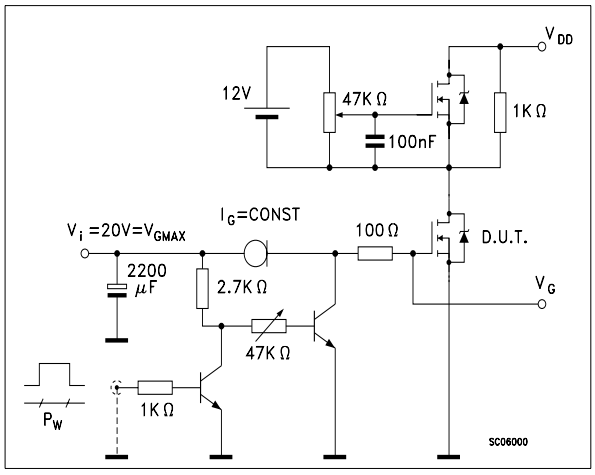
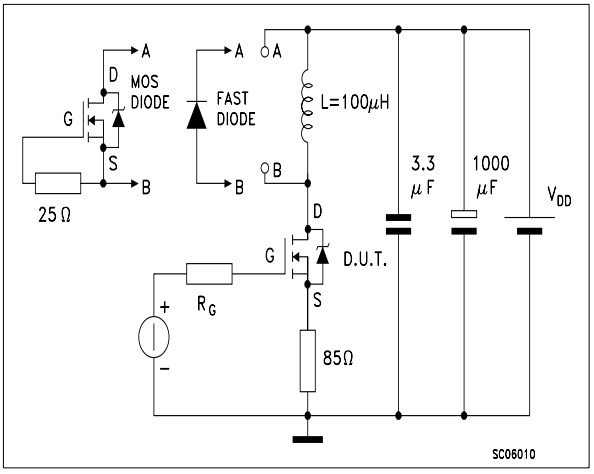
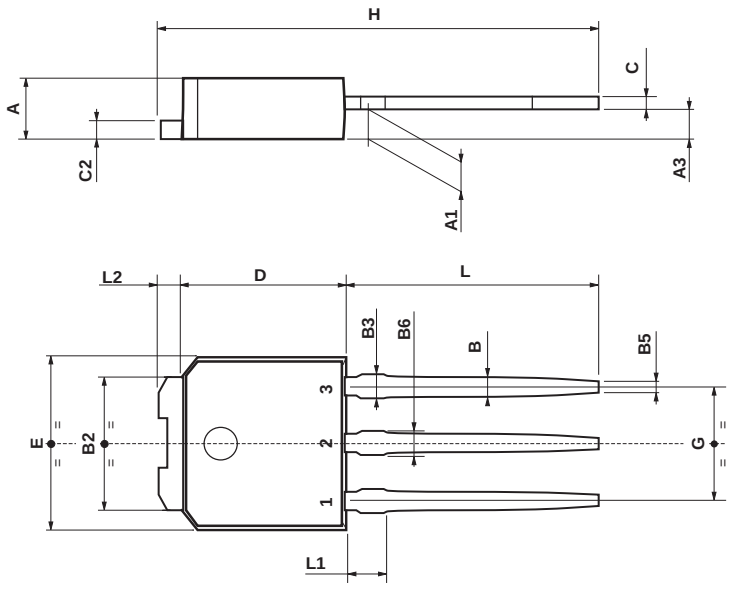


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-251 (IPAK) MECHANICAL DATA

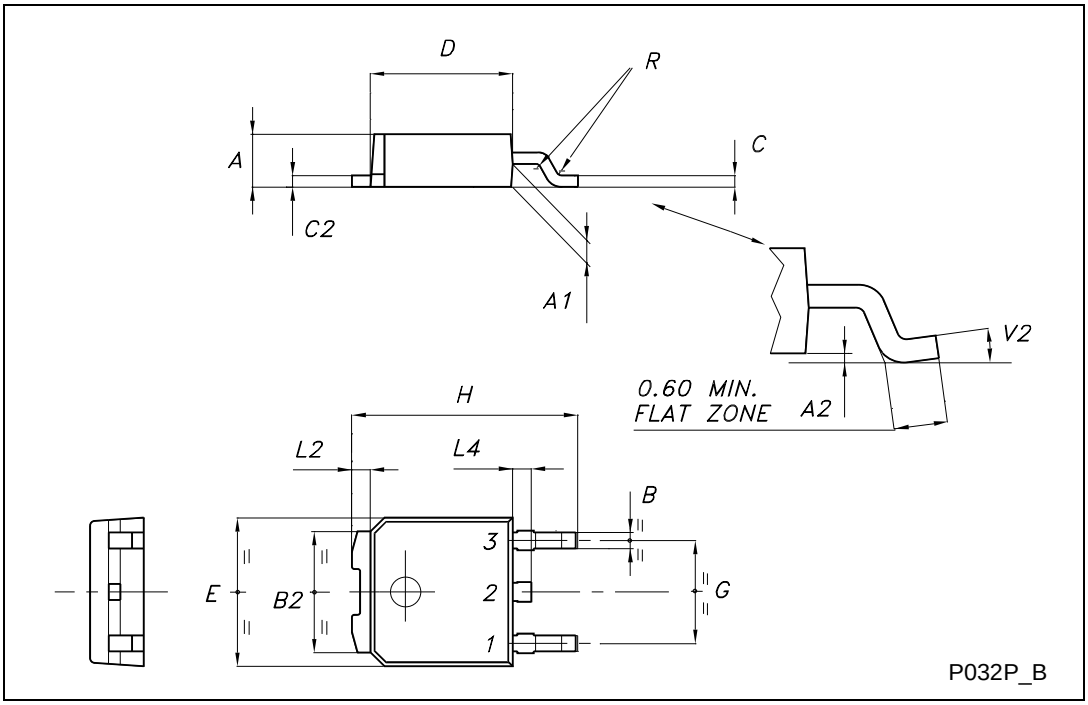
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A3	0.7		1.3	0.027		0.051
B	0.64		0.9	0.025		0.031
B2	5.2		5.4	0.204		0.212
B3			0.85			0.033
B5		0.3			0.012	
B6			0.95			0.037
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	15.9		16.3	0.626		0.641
L	9		9.4	0.354		0.370
L1	0.8		1.2	0.031		0.047
L2		0.8	1		0.031	0.039



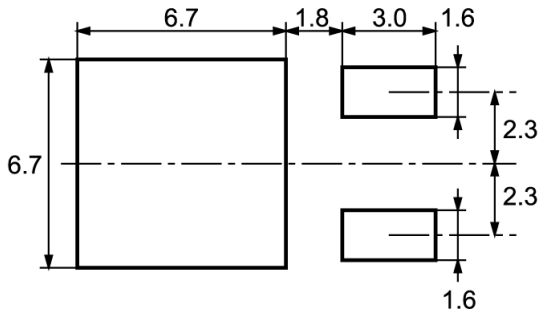
0068771-E

TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0^o		8^o	0^o		0^o

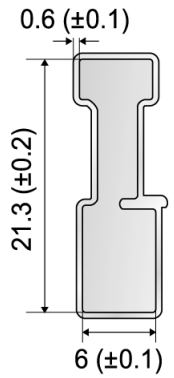


DPAK FOOTPRINT



All dimensions are in millimeters

TUBE SHIPMENT (no suffix)*



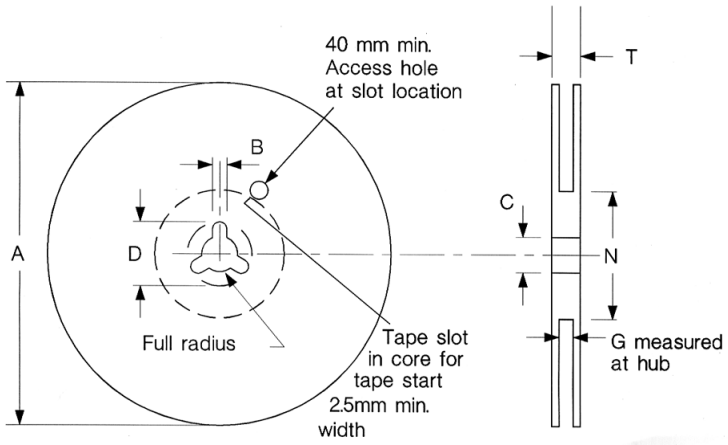
BASE QTY
75

BULK QTY
3000

Tube length 532 (±0.5)

All dimensions are in millimeters

TAPE AND REEL SHIPMENT (suffix "T4")*



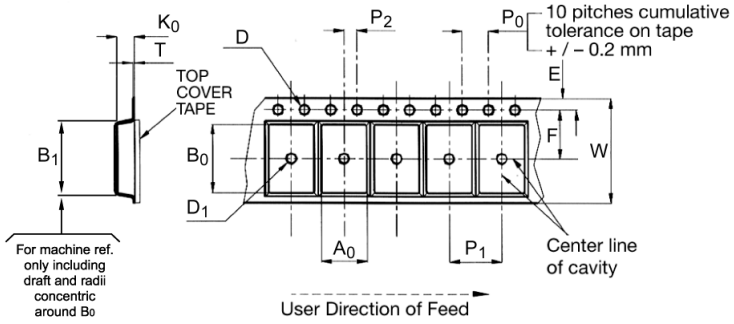
REEL MECHANICAL DATA

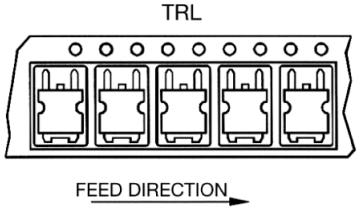
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

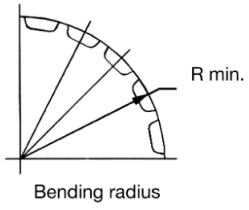
BASE QTY	BULK QTY
2500	2500

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641







* on sales type