



STB16NS25

N-CHANNEL 250V - 0.23Ω - 16A D²PAK
MESH OVERLAY™ MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB16NS25	250 V	< 0.28 Ω	16 A

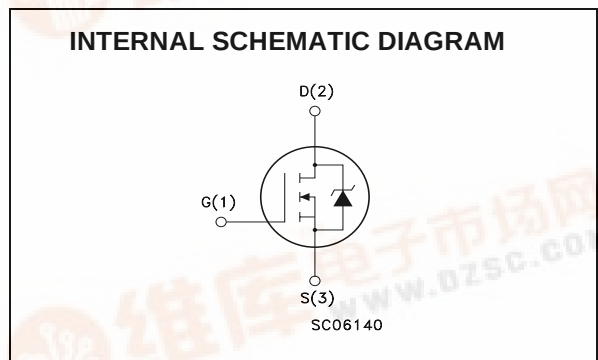
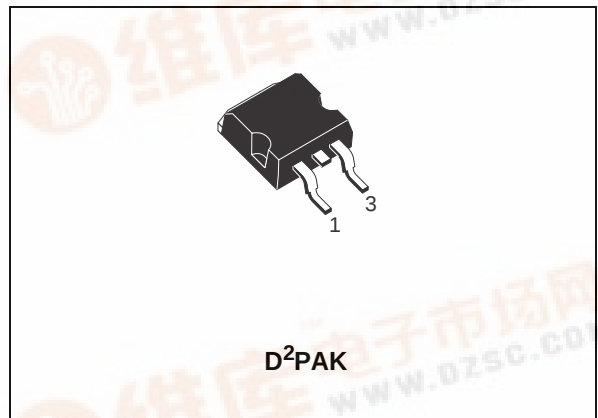
- TYPICAL R_{DS(on)} = 0.23 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED

DESCRIPTION

Using the latest high voltage MESH OVERLAY™ process, STMicroelectronics has designed an advanced family of power MOSFETs with outstanding performance. The new patented STrip layout coupled with the Company's proprietary edge termination structure, makes it suitable in converters for lighting applications.

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITCH MODE POWER SUPPLIES (SMPS)
- DC-DC CONVERTERS FOR TELECOM, INDUSTRIAL, AND LIGHTING EQUIPMENT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	250	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	250	V
V _{GS}	Gate- source Voltage	± 20	V
I _D	Drain Current (continuous) at T _C = 25°C	16	A
I _D	Drain Current (continuous) at T _C = 100°C	11	A
I _{DM} (•)	Drain Current (pulsed)	64	A
P _{TOT}	Total Dissipation at T _C = 25°C	140	W
	Derating Factor	1	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	5	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} ≤ 16A, di/dt ≤ 300 A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{jMAX}

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THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.9	°C/W
Rthj-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)	16	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 28 V)	200	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	250			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 50	µA µA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ± 20 V			±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} = 10V, I _D = 8 A		0.23	0.28	Ω

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 A	14	15		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		1270		pF
C _{oss}	Output Capacitance			190		pF
C _{rss}	Reverse Transfer Capacitance			75		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 125\text{ V}$, $I_D = 8\text{ A}$		15		ns
t_r	Rise Time	$R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$ (see test circuit, Figure 3)		25		ns
Q_g	Total Gate Charge	$V_{DD} = 200\text{ V}$, $I_D = 16\text{ A}$, $V_{GS} = 10\text{ V}$		60	80	nC
Q_{gs}	Gate-Source Charge			8		nC
Q_{gd}	Gate-Drain Charge			22		nC

SWITCHING OFF

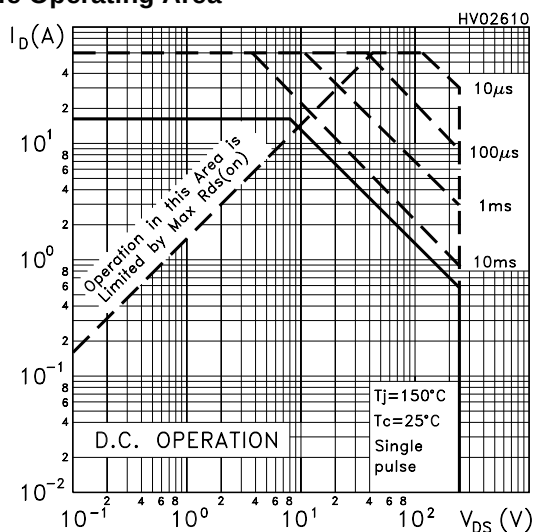
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off Delay Time	$V_{DD} = 125\text{ V}$, $I_D = 8\text{ A}$, $R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$ (see test circuit, Figure 3)		75		ns
t_f	Fall Time			35		ns
$t_{r(Voff)}$	Off-voltage Rise Time	$V_{clamp} = 200\text{ V}$, $I_D = 16\text{ A}$, $R_G = 4.7\Omega$, $V_{GS} = 10\text{ V}$ (see test circuit, Figure 5)		25		ns
t_f	Fall Time			30		ns
t_c	Cross-over Time			55		ns

SOURCE DRAIN DIODE

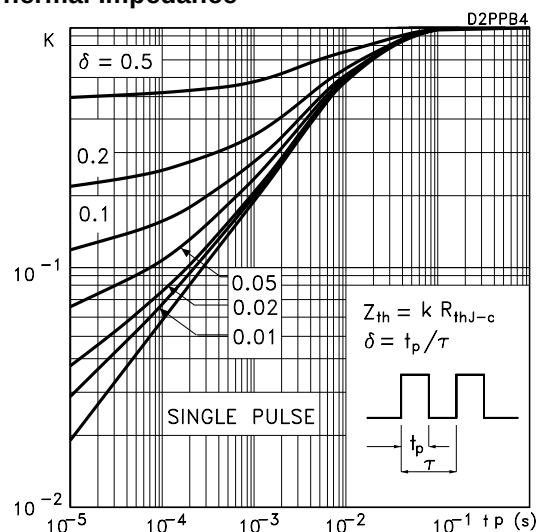
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				16	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				64	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 16\text{ A}$, $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 16\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 33\text{ V}$, $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		270		ns
Q_{rr}	Reverse Recovery Charge			1.5		μC
I_{RRM}	Reverse Recovery Current			11.5		A

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

Safe Operating Area

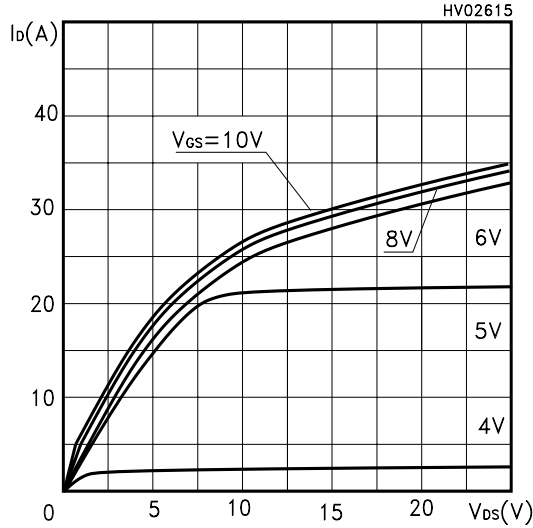


Thermal Impedance

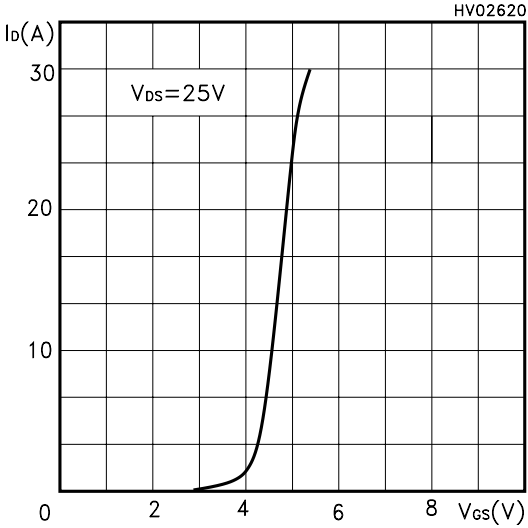


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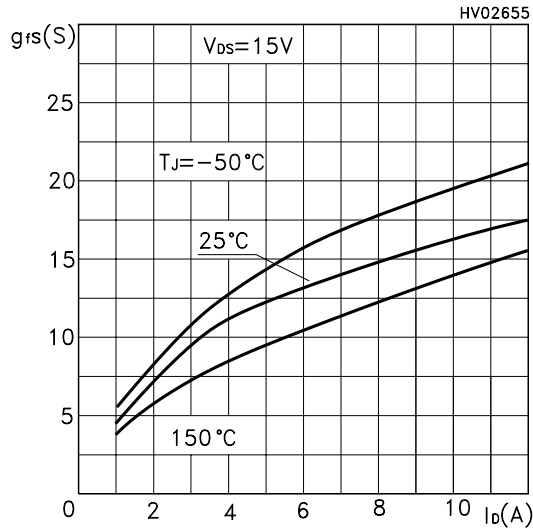
Output Characteristics



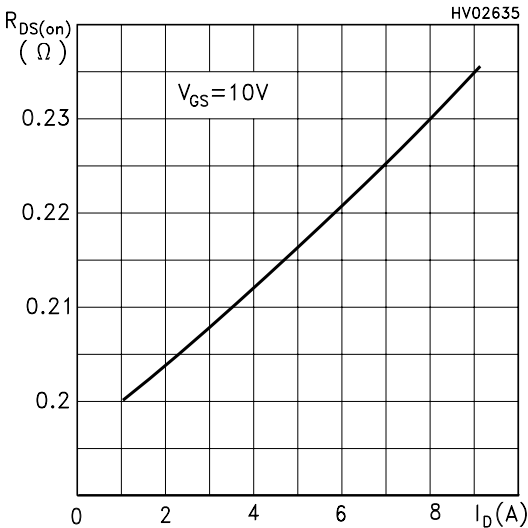
Transfer Characteristics



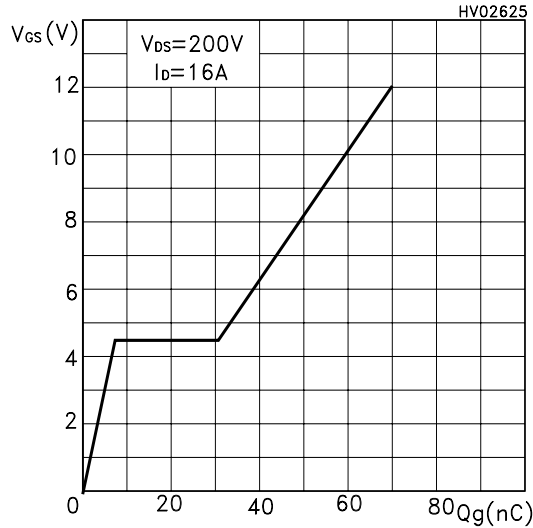
Transconductance



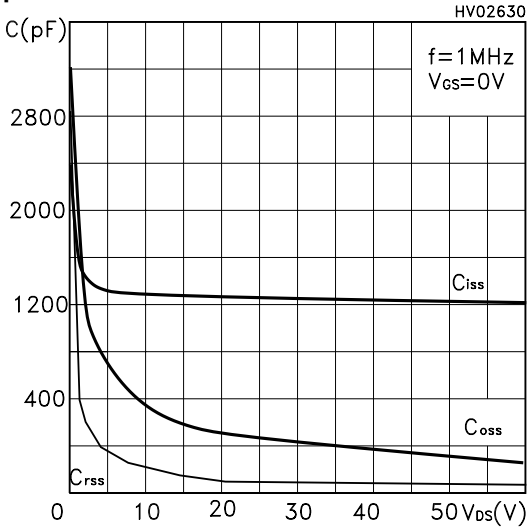
Static Drain-source On Resistance



Gate Charge vs Gate-source Voltage



Capacitance Variations



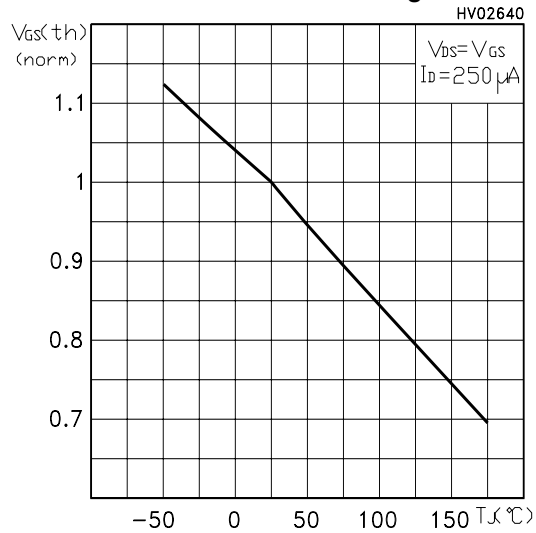
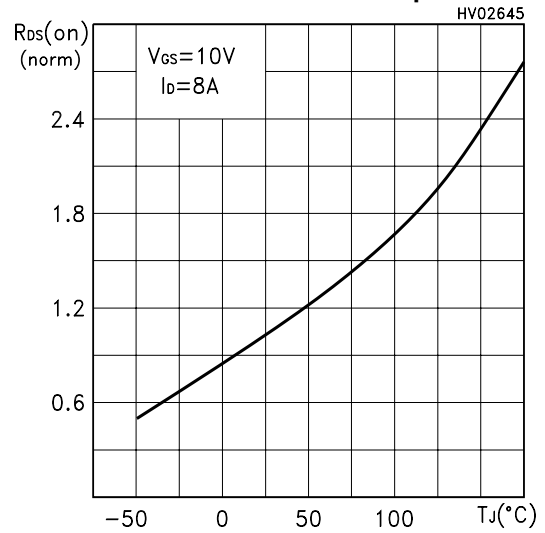
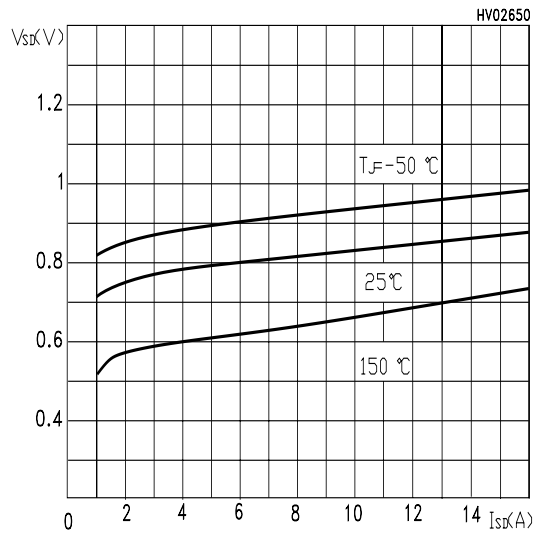
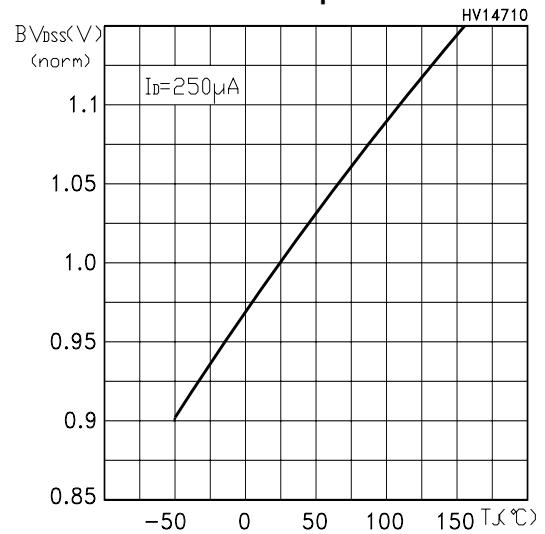
Normalized Gate Threshold Voltage vs Temp.**Normalized On Resistance vs Temperature****Source-drain Diode Forward Characteristics****Normalized BVDSS vs Temperature**

Fig. 1: Unclamped Inductive Load Test Circuit

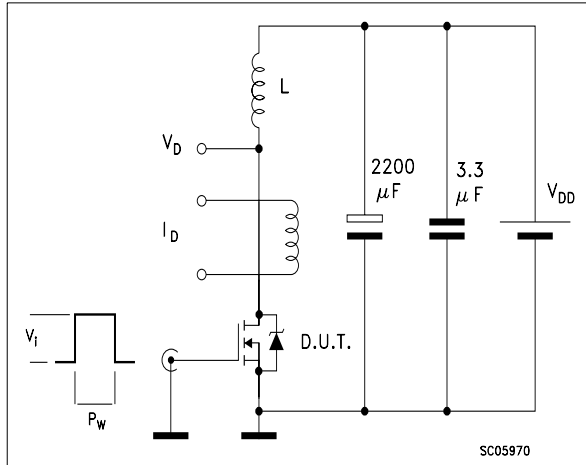


Fig. 2: Unclamped Inductive Waveform

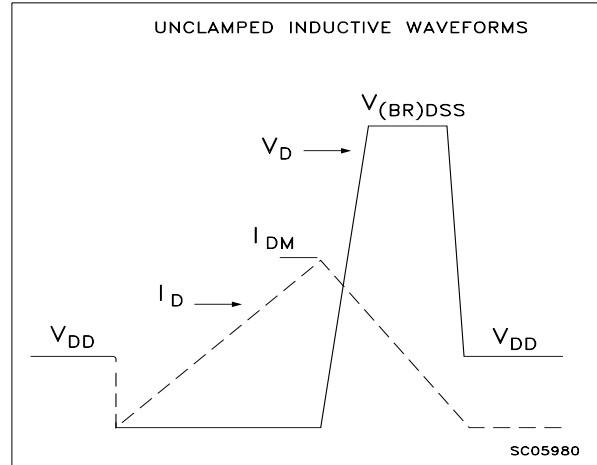


Fig. 3: Switching Times Test Circuit For Resistive Load

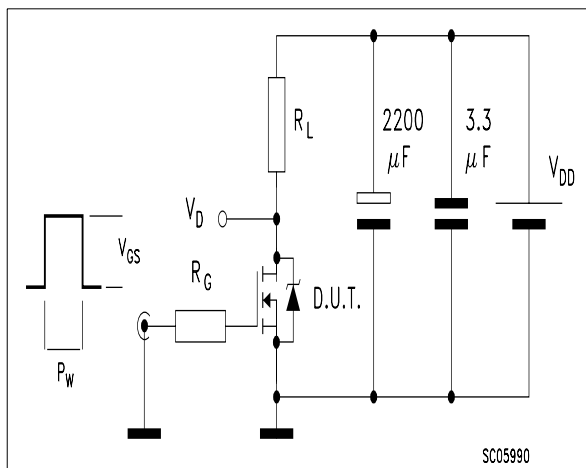


Fig. 4: Gate Charge test Circuit

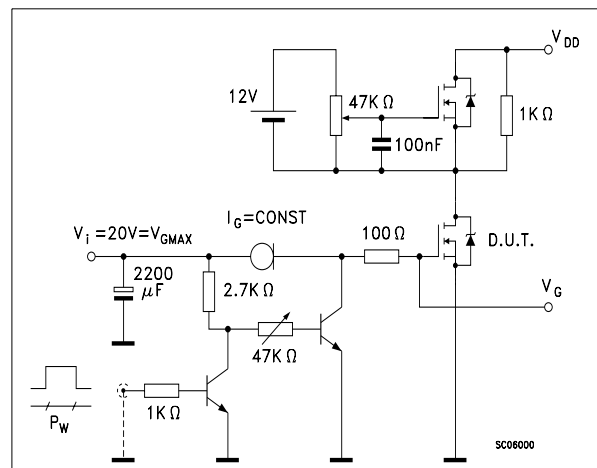
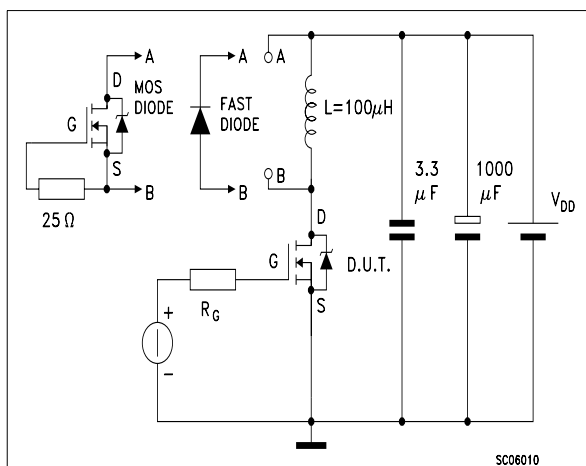
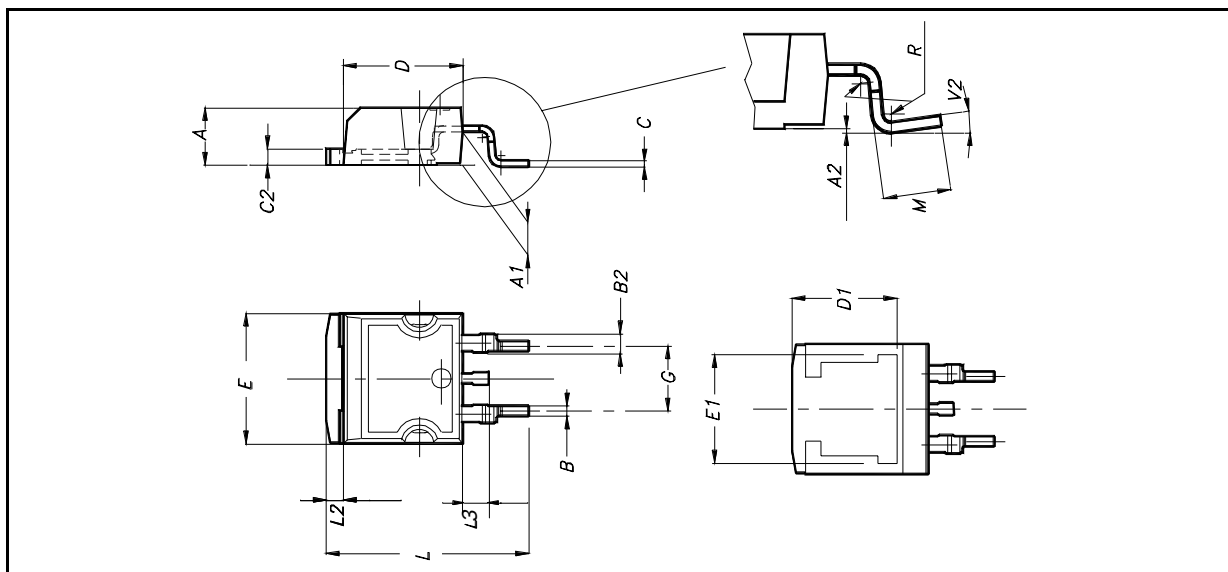


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

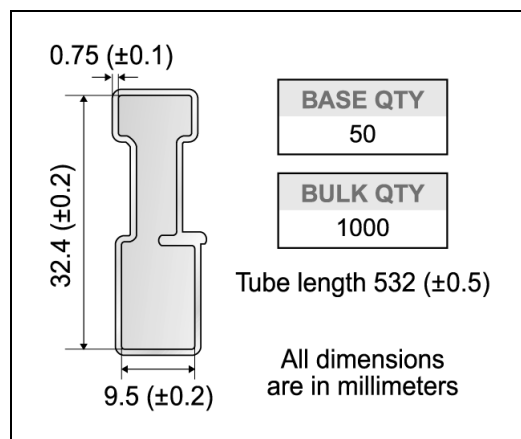


D²PAK MECHANICAL DATA

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°		4°			



TUBE SHIPMENT (no suffix)*



TAPE MECHANICAL DATA

Diagram 1: Top view of a circular reel with dimensions A (outer diameter), B (inner diameter), C (core diameter), D (core hole diameter), and G (measured at hub). A note indicates '40 mm min. Access hole at slot location' and 'Tape slot in core for tape start'.

Diagram 2: Side view of the reel showing dimensions T (thickness), N (width), 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

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

TAPE MECHANICAL DATA

Diagram 1: Top view of a tape reel showing dimensions A0, B0, D, D1, E, F, K0, P0, P1, P2, T, and W. A note indicates '10 pitches cumulative tolerance on tape +/- 0.2 mm'.

Diagram 2: Side view of the tape reel showing dimensions A0, B0, D, D1, E, F, K0, P0, P1, P2, T, and W. A note indicates 'Center line of cavity'.

Diagram 3: Top view of a tape reel showing dimensions A0, B0, D, D1, E, F, K0, P0, P1, P2, T, and W. A note indicates 'User Direction of Feed'.

Diagram 4: Side view of a tape reel showing dimensions A0, B0, D, D1, E, F, K0, P0, P1, P2, T, and W. A note indicates 'Feeding direction'.

Diagram 5: Top view of a tape reel showing dimensions A0, B0, D, D1, E, F, K0, P0, P1, P2, T, and W. A note indicates 'Bending radius'.

* on sales type

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