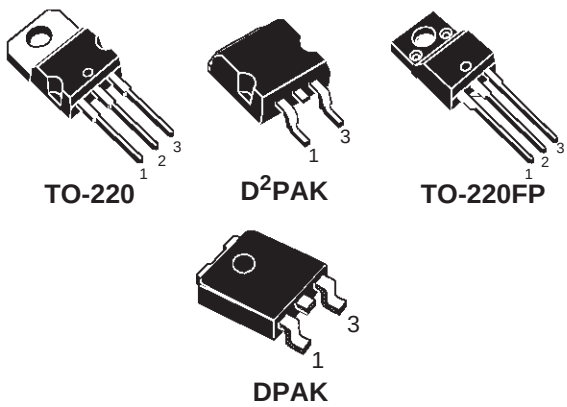
STGP7NB60K - STGP7NB60KFP
STGB7NB60K - STGD7NB60K

N-CHANNEL 7A - 600V - TO-220/FP/D^{2}PAK/DPAK
PowerMESH™ IGBT

TYPE	V_{CES}	$V_{CE(sat)}$ (Typ) @125°C	I_C @125°C
STGP7NB60K	600 V	< 1.9 V	7 A
STGP7NB60KFP	600 V	< 1.9 V	7 A
STGB7NB60K	600 V	< 1.9 V	7 A
STGD7NB60K	600 V	< 1.9 V	7 A

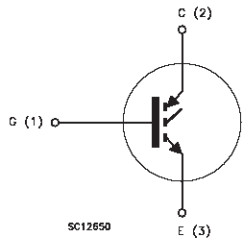
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{cesat})
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- OFF LOSSES INCLUDE TAIL CURRENT
- VERY HIGH FREQUENCY OPERATION
- SHORT CIRCUIT RATED



DESCRIPTION

Using the latest high voltage technology based on a patented strip layout, STMicroelectronics has designed an advanced family of IGBTs, the PowerMESH™ IGBTs, with outstanding performances. The suffix “K” identifies a family optimized for high frequency motor control applications with short circuit withstand capability.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- HIGH FREQUENCY MOTOR CONTROLS
- SMPS AND PFC IN BOTH HARD SWITCH AND RESONANT TOPOLOGIES

ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STGP7NB60K	GP7NB60K	TO-220	TUBE
STGP7NB60KFP	GP7NB60KFP	TO-220FP	TUBE
STGB7NB60KT4	GB7NB60K	D^{2}PAK	TAPE & REEL
STGD7NB60KT4	GD7NB60K	DPAK	TAPE & REEL

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value			Unit
		TO-220 / D^2PAK	TO-220FP	DPAK	
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	600			V
V_{ECR}	Emitter-Collector Voltage	20			V
V_{GE}	Gate-Emitter Voltage	±20			V
I_C	Collector Current (continuos) at T_C = 25°C	14			A
I_C	Collector Current (continuos) at T_C = 100°C	7			A
I_{CM} (n)	Collector Current (pulsed)	50			A
P_{TOT}	Total Dissipation at T_C = 25°C	65	28	45	W
	Derating Factor	0.64	0.28	0.64	W/°C
V_{ISO}(1)	Insulation Withstand Voltage A.C.	--	2500	--	V
T_{stg}	Storage Temperature	–65 to 150			°C
T_j	Max. Operating Junction Temperature	150			°C

(n) Pulse width limited by safe operating area
(1) (t =1 sec; Tc=25°C)

THERMAL DATA

		TO-220	D^2PAK	TO-220FP	DPAK	
Rthj-case	Thermal Resistance Junction-case Max	1.62		4.1	2.1	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5			100	°C/W
Rthc-h	Thermal Resistance Case-heatsink Typ	0.5				°C/W

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED)

MAIN PARAMETERS

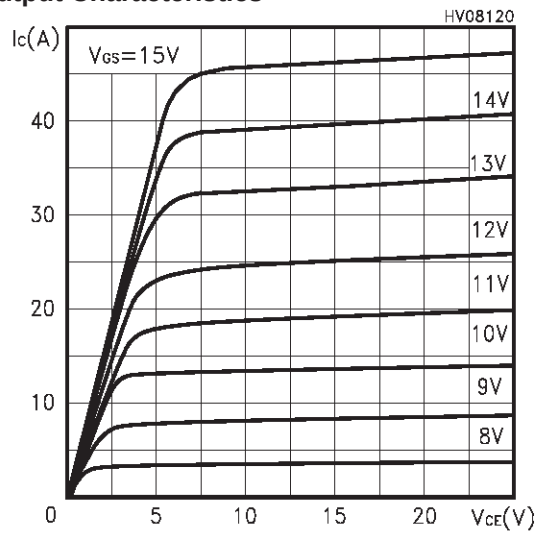
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{BR(CES)}$	Collector-Emitter Breakdown Voltage	I_C = 250 µA, V_{GE} = 0	600			V
I_{CES}	Collector cut-off (V_{GE} = 0)	V_{CE} = Max Rating, T_C = 25 °C V_{CE} = Max Rating, T_C = 125 °C			50 500	µA µA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ±20V , V_{CE} = 0			±100	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE} = V_{GE}, I_C = 250µA	5		7	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15V, I_C = 7 A V_{GE} = 15V, I_C = 7 A, Tj =125°C		2.3 1.9	2.8	V V

MAIN PARAMETERS

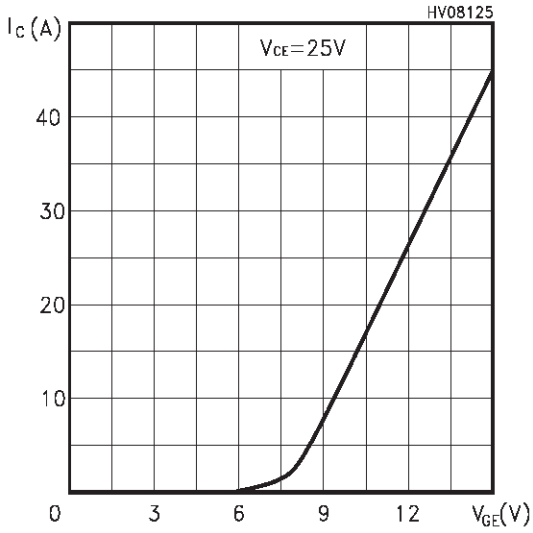
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 15V, Ic = 7 A		3.7		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25V, f = 1 MHz, V_{GE} = 0		495 77 13		pF pF pF
Q_g Q_{ge} Q_{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V_{CE} = 480V, I_C = 7 A, V_{GE} = 15V		32.7 5.9 18.3		nC nC nC
tscw	Short Circuit Withstand Time	V_{ce} = 0.5 $V_{BR(CES)}$, V_{GE}=15V, Tj = 125°C , R_G = 10 Ω	10			µs
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	V_{CC} = 480 V, I_C = 7 A R_G = 10Ω, V_{GE} = 15 V		15 6		ns ns
t_c $t_r(V_{off})$ $t_{d(off)}$ t_f E_{off}(**) E_{ts}	Cross-over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss Total Switching Loss	V_{cc} = 480 V, I_C = 7 A, R_{GE} = 10 Ω , V_{GE} = 15 V		85 20 75 70 85 235		ns ns ns ns µJ µJ
t_c $t_r(V_{off})$ $t_{d(off)}$ t_f E_{off}(**) E_{ts}	Cross-over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss Total Switching Loss	V_{cc} = 480 V, I_C = 7 A, R_{GE} = 10 Ω , V_{GE} = 15 V Tj = 125 °C		150 50 110 110 220 405		ns ns ns ns µJ µJ

(**)Losses include Also the Tail (Jedec Standardization)

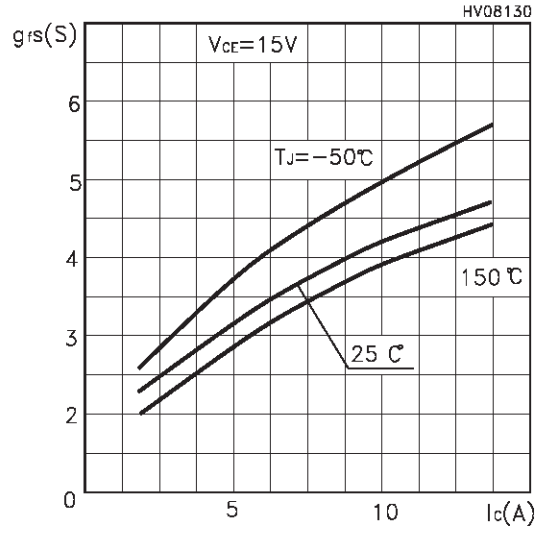
Output Characteristics



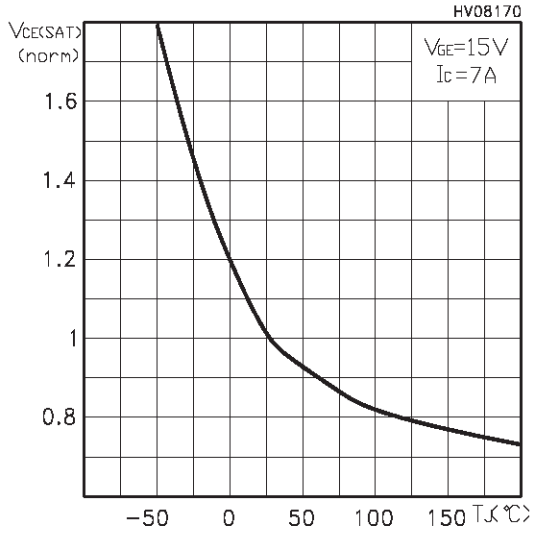
Transfer Characteristics



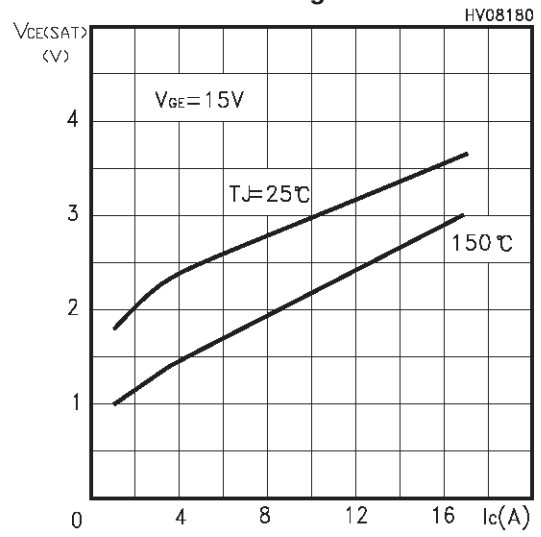
Transconductance



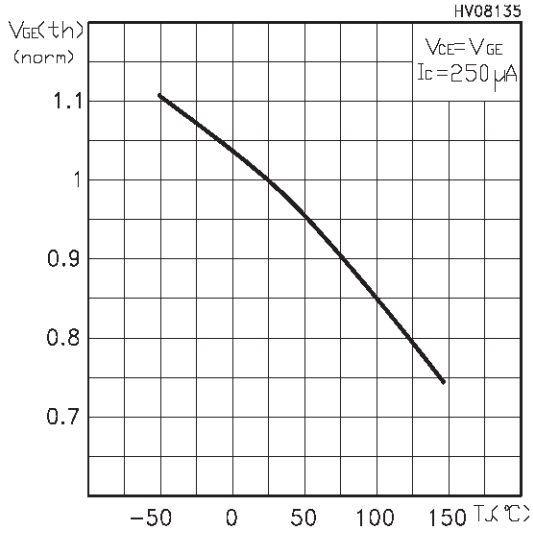
Normalized Collector-Emitter On Voltage vs Temp.



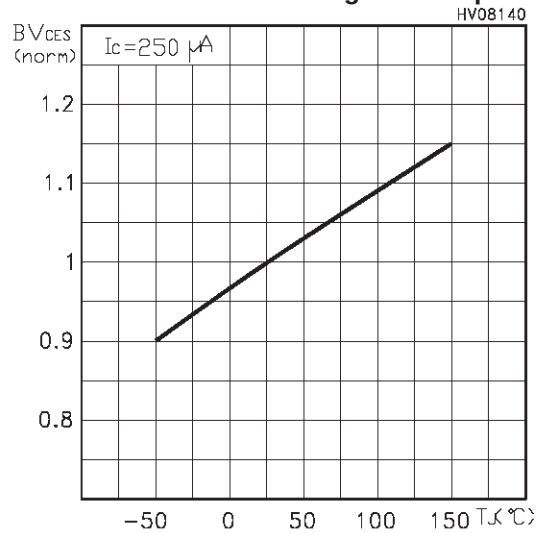
Collector-Emitter On Voltage vs Collector Current



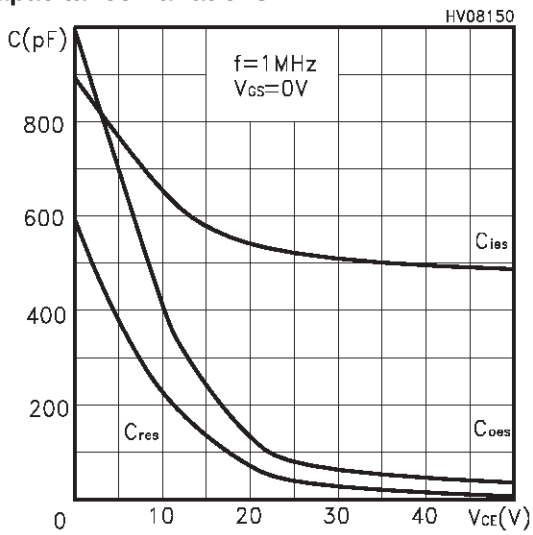
Gate Threshold vs Temperature



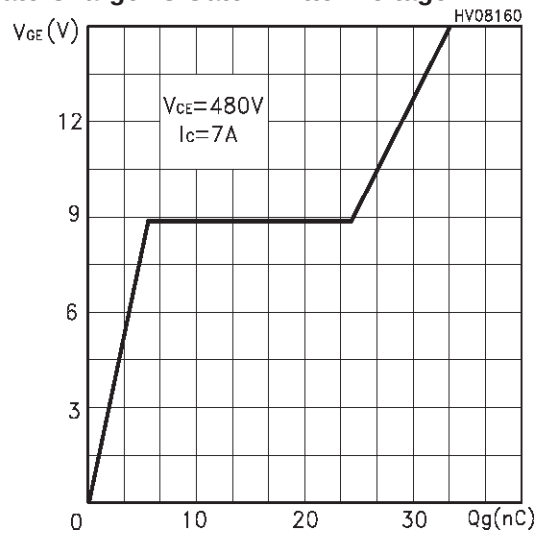
Normalized Breakdown Voltage vs Temperature



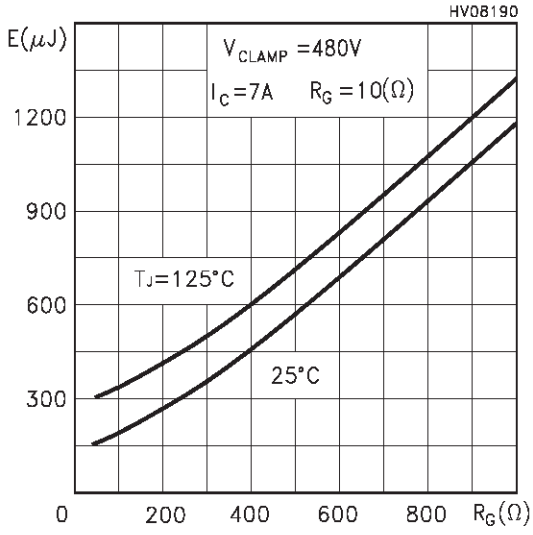
Capacitance Variations



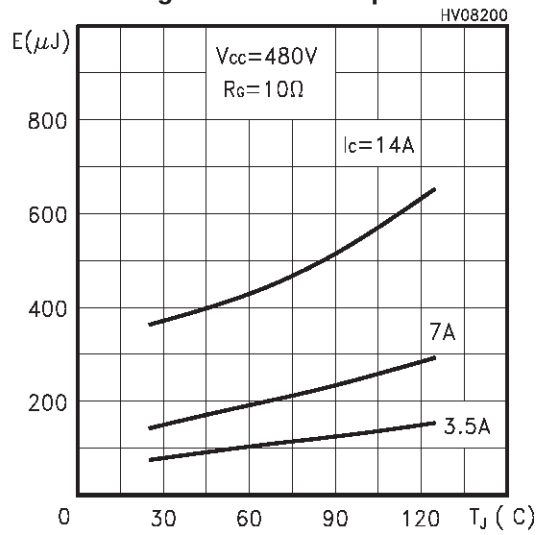
Gate Charge vs Gate-Emitter Voltage



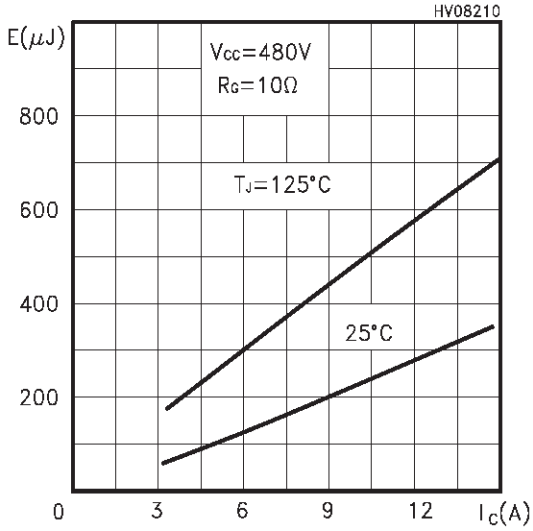
Total Switching Losses vs Gate Resistance



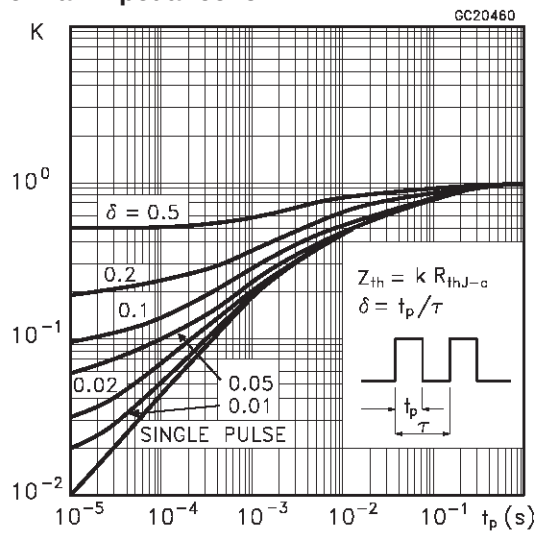
Total Switching Losses vs Temperature



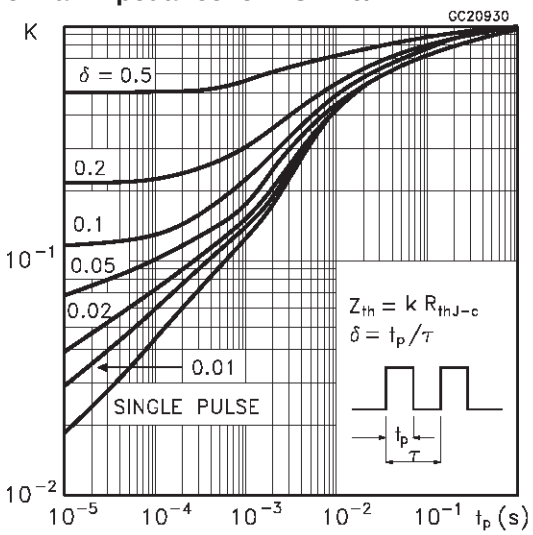
Total Switching Losses vs Collector Current



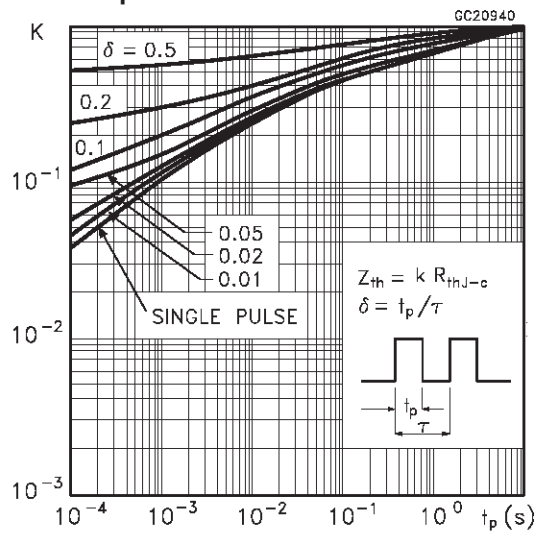
Thermal Impedance for DPAK



Thermal Impedance for TO-220/D²PAK



Thermal Impedance for TO-220FP



Turn-Off SOA

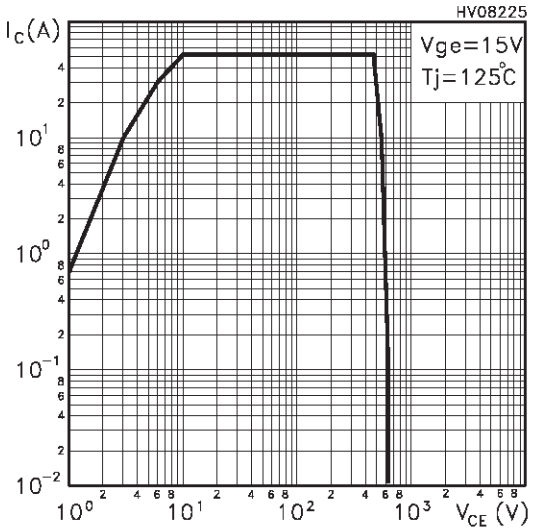


Fig. 1: Gate Charge test Circuit

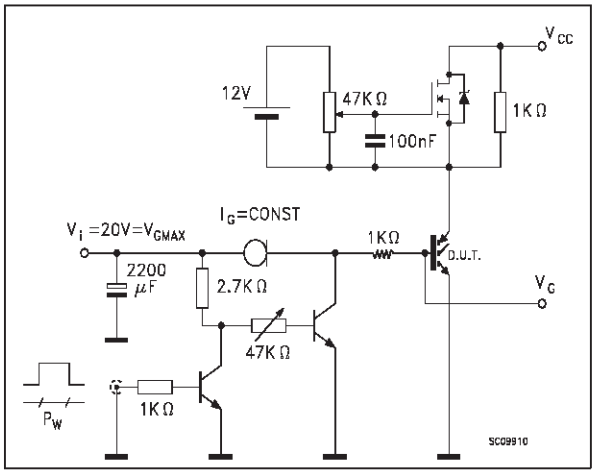
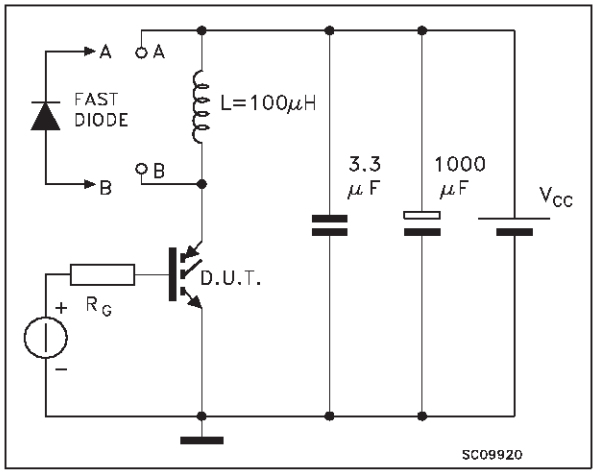
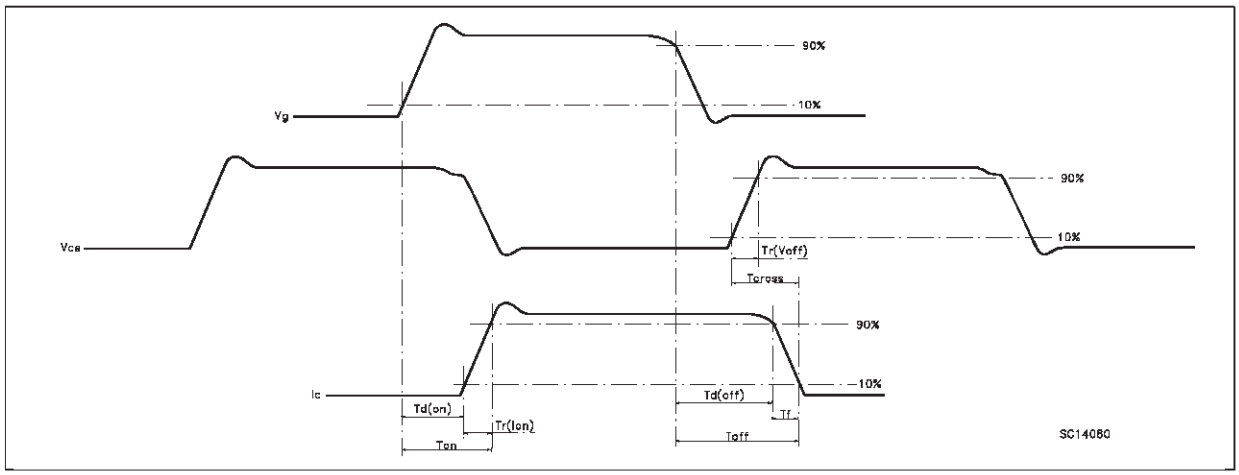


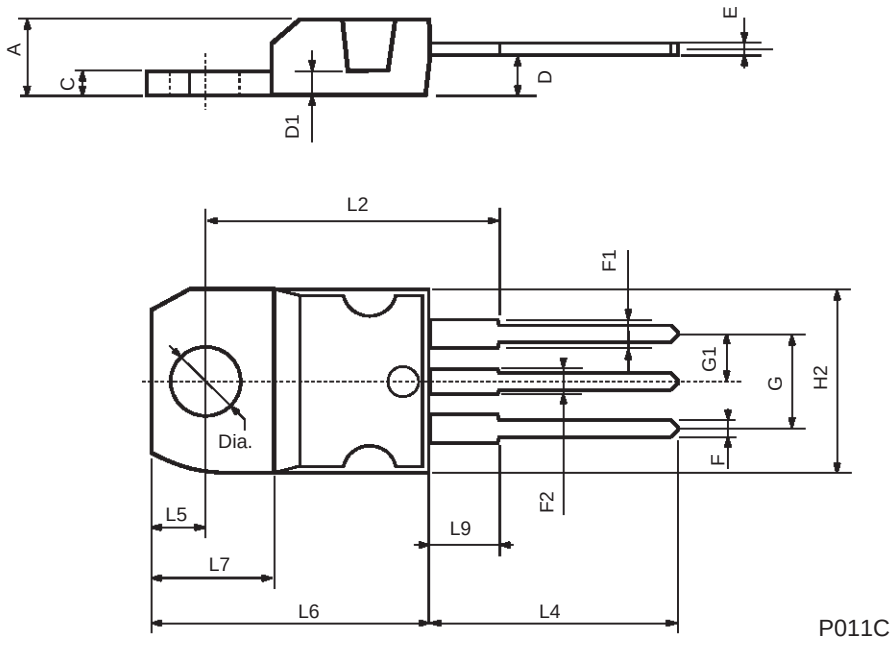
Fig. 2: Test Circuit For Inductive Load Switching





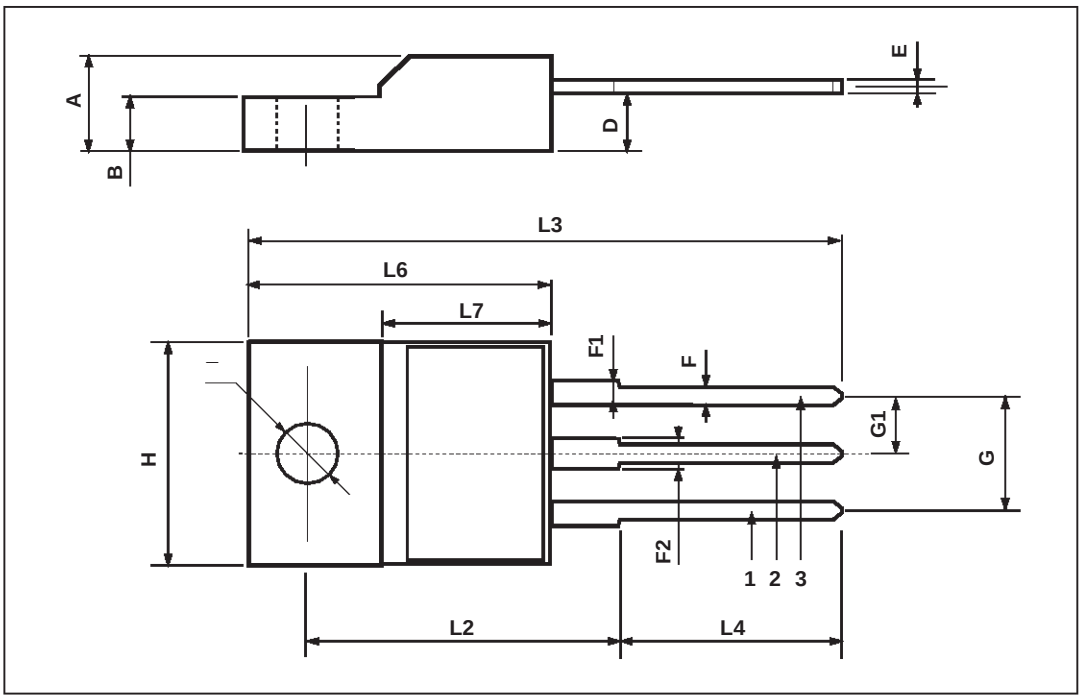
TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151



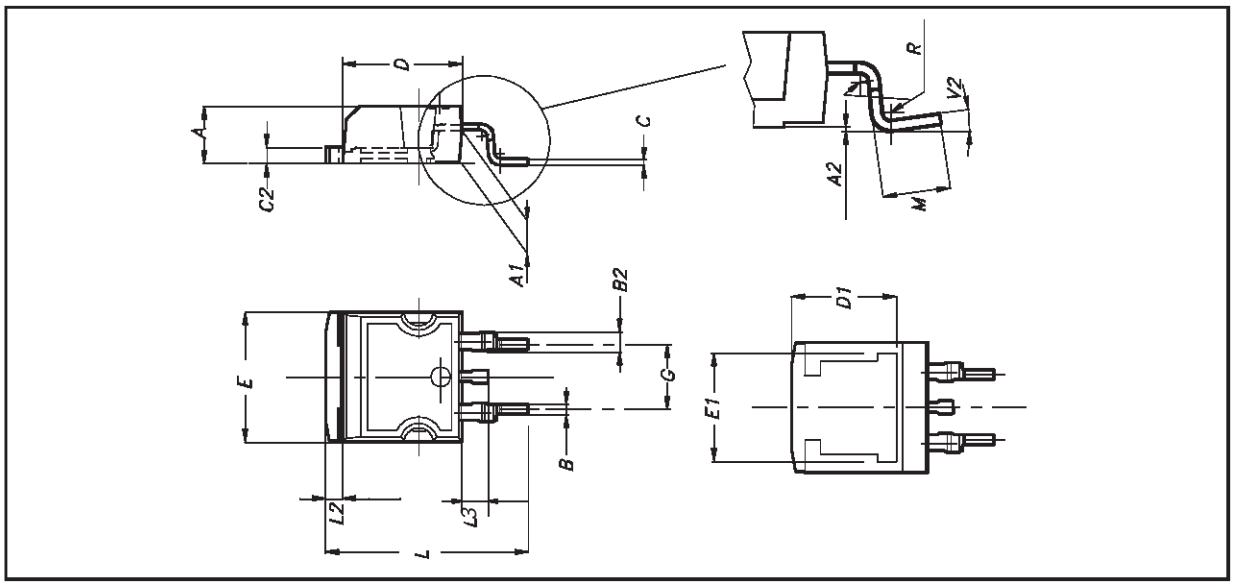
TO-220FP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
B	2.5		2.7	0.098		0.106
D	2.5		2.75	0.098		0.108
E	0.45		0.7	0.017		0.027
F	0.75		1	0.030		0.039
F1	1.15		1.7	0.045		0.067
F2	1.15		1.7	0.045		0.067
G	4.95		5.2	0.195		0.204
G1	2.4		2.7	0.094		0.106
H	10		10.4	0.393		0.409
L2		16			0.630	
L3	28.6		30.6	1.126		1.204
L4	9.8		10.6	0.385		0.417
L6	15.9		16.4	0.626		0.645
L7	9		9.3	0.354		0.366
Ø	3		3.2	0.118		0.126



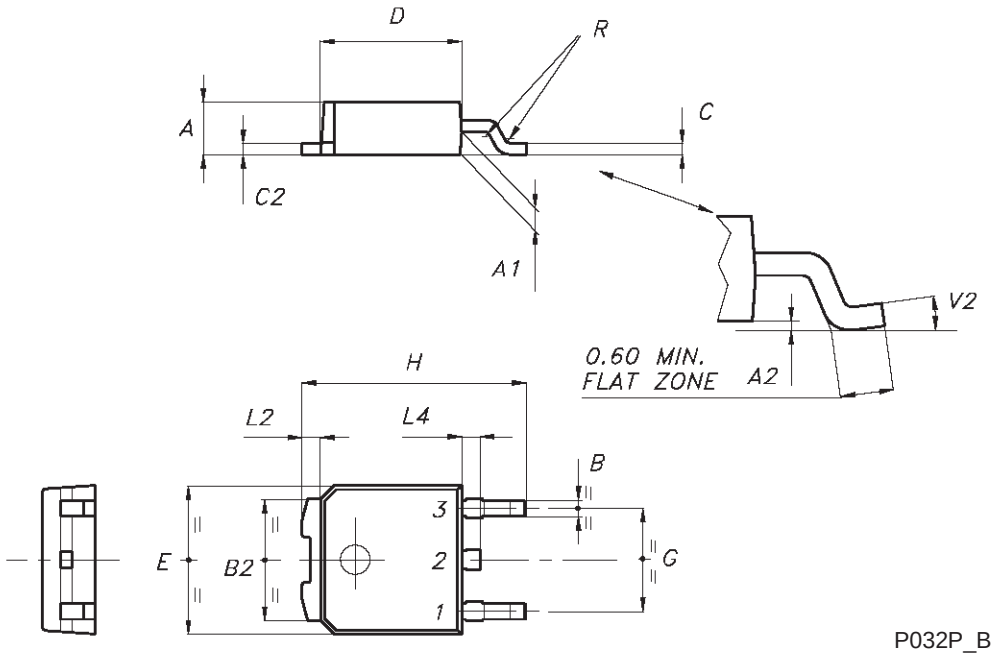
D^2PAK MECHANICAL DATA

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	0º		8º			



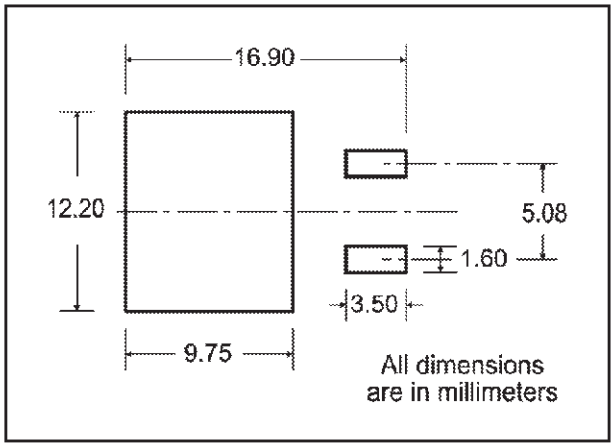
TO-252 (DPAK) MECHANICAL DATA

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

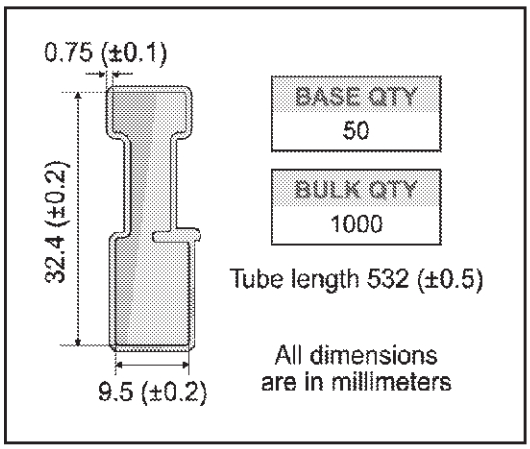


P032P_B

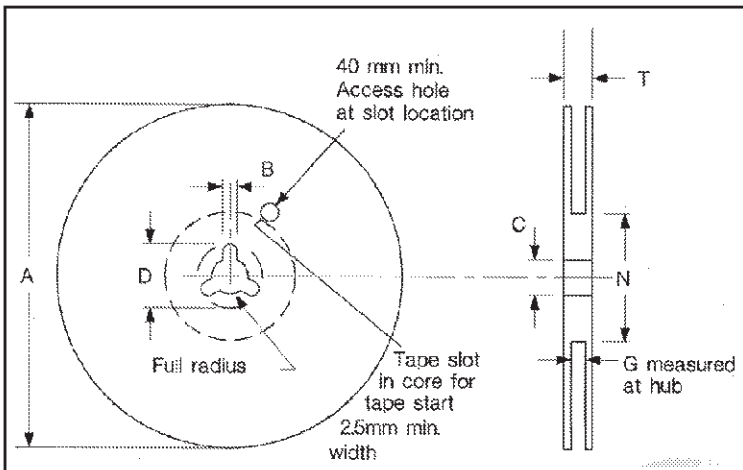
D²PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*



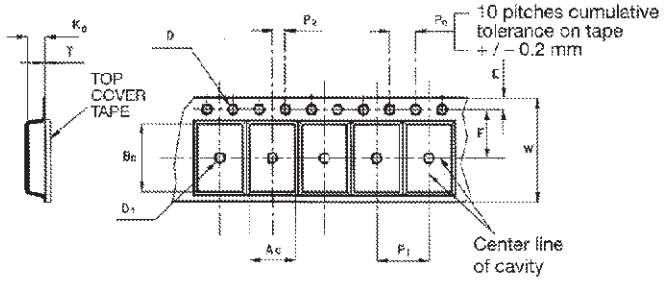
REEL MECHANICAL DATA

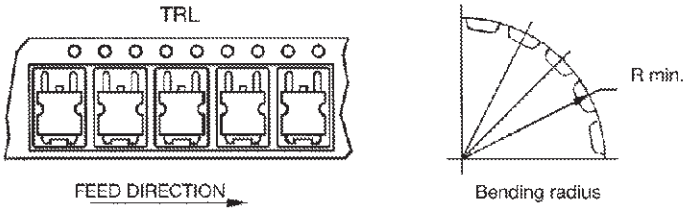
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

TAPE MECHANICAL DATA

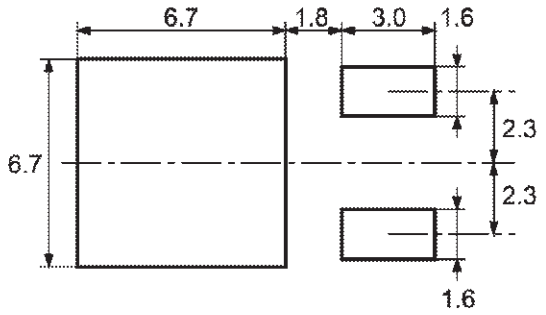
DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	11.9	12.1	0.468	0.476
P2	1.9	2.1	0.075	0.082
R	50		1.574	
T	0.25	0.35	0.0098	0.0137
W	23.7	24.3	0.933	0.956





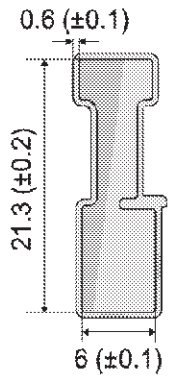
* on sales type

DPAK FOOTPRINT



All dimensions are in millimeters

TUBE SHIPMENT (no suffix)*

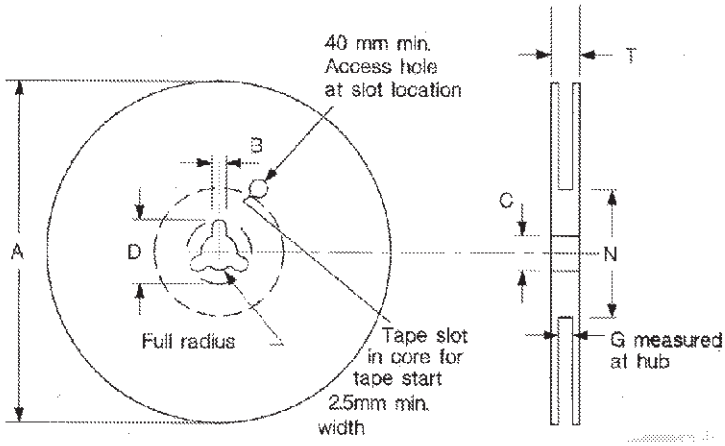


BASE QTY
75
BULK QTY
3000

Tube length 532 (±0.5)

All dimensions are in millimeters

TAPE AND REEL SHIPMENT (suffix "T4")*



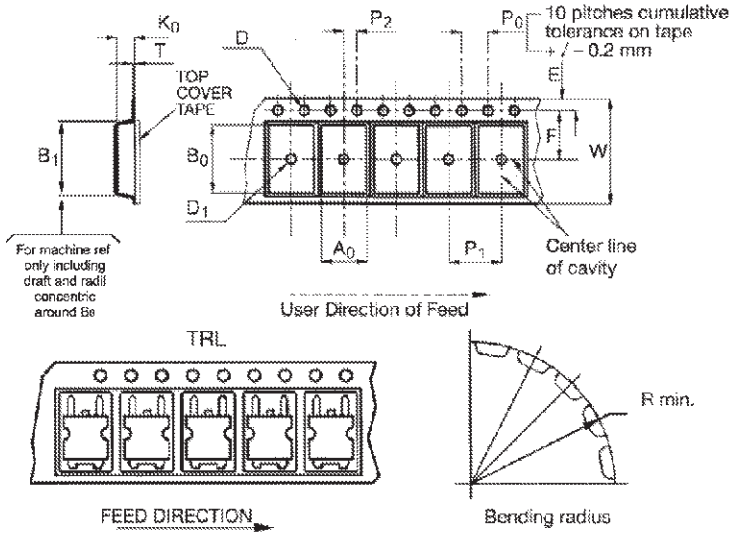
REEL MECHANICAL DATA

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