



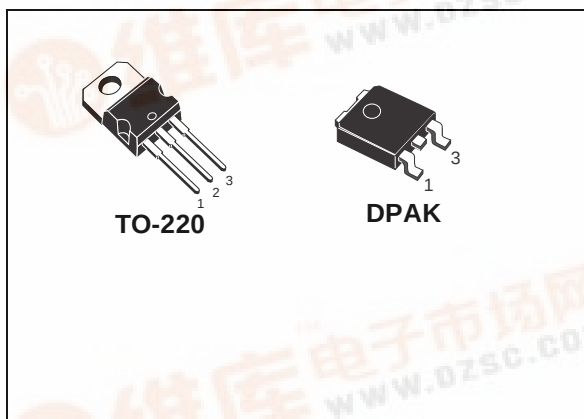
STGP7NB60M - STGD7NB60M

N-CHANNEL 7A - 600V TO-220 / DPAK

PowerMESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)} (Max) @25°C	I _C @100°C
STGP7NB60M	600 V	< 1.9 V	7 A
STGD7NB60M	600 V	< 1.9 V	7 A

- HIGH INPUT IMPEDANCE
- LOW ON-VOLTAGE DROP (V_{cesat})
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- HIGH FREQUENCY OPERATION
- CO-PACKAGED WITH TURBOSWITCH™ ANTIPARALLEL DIODE



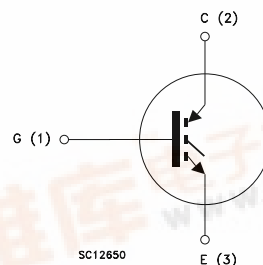
DESCRIPTION

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 "M" identifies a family optimized to achieve very low switching times for high frequency applications (<20KHZ)

APPLICATIONS

- MOTOR CONTROLS
- SMPS AND PFC AND BOTH HARD SWITCH AND RESONANT TOPOLOGIES

INTERNAL SCHEMATIC DIAGRAM



ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STGP7NB60M	GP7NB60M	TO-220	TUBE
STGD7NB60MT4	GD7NB60M	DPAK	TAPE & REEL

STGP7NB60M - STGD7NB60M

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value		Unit
		TO-220	DPAK	
V_{CES}	Collector-Emitter Voltage ($V_{GS} = 0$)	600		V
V_{GE}	Gate-Emitter Voltage	± 20		V
I_C	Collector Current (continuous) at $T_C = 25^\circ\text{C}$	14		A
I_C	Collector Current (continuous) at $T_C = 100^\circ\text{C}$	7		A
I_{CM} (■)	Collector Current (pulsed)	56		A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	80	70	W
	Derating Factor	0.64	0.56	W/°C
T_{stg}	Storage Temperature	– 55 to 150		°C
T_j	Max. Operating Junction Temperature	150		°C

(■) Pulse width limited by safe operating area

THERMAL DATA

		TO-220	DPAK	
$R_{thj-case}$	Thermal Resistance Junction-case Max	1.56	1.78	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	62.5	100	°C/W

ELECTRICAL CHARACTERISTICS ($T_{CASE} = 25^\circ\text{C}$ UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{BR(CES)}$	Collector-Emitter Breakdown Voltage	$I_C = 250\ \mu\text{A}$, $V_{GE} = 0$	600			V
I_{CES}	Collector cut-off ($V_{GE} = 0$)	$V_{CE} = \text{Max Rating}$, $T_C = 25^\circ\text{C}$			50	μA
		$V_{CE} = \text{Max Rating}$, $T_C = 125^\circ\text{C}$			100	μA
I_{GES}	Gate-Emitter Leakage Current ($V_{CE} = 0$)	$V_{GE} = \pm 20\text{V}$, $V_{CE} = 0$			± 100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE} = V_{GE}$, $I_C = 250\ \mu\text{A}$	3		5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE} = 15\text{V}$, $I_C = 7\text{A}$		1.5	1.9	V
		$V_{GE} = 15\text{V}$, $I_C = 7\text{A}$, $T_j = 125^\circ\text{C}$		1.2		V

ELECTRICAL CHARACTERISTICS (CONTINUED)

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{CE} = 25\text{ V}$, $I_C = 7\text{ A}$		5		S
C_{ies}	Input Capacitance	$V_{CE} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GE} = 0$		550		pF
C_{oes}	Output Capacitance			85		pF
C_{res}	Reverse Transfer Capacitance			13		pF
Q_g Q_{ge} Q_{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	$V_{CE} = 480\text{ V}$, $I_C = 7\text{ A}$, $V_{GE} = 15\text{ V}$		37 4.2 13	50	nC nC nC
I_{CL}	Latching Current	$V_{clamp} = 480\text{ V}$, $V_{GE} = 15\text{ V}$ $T_J = 125^\circ\text{C}$, $R_G = 10\ \Omega$		28		A

SWITCHING ON

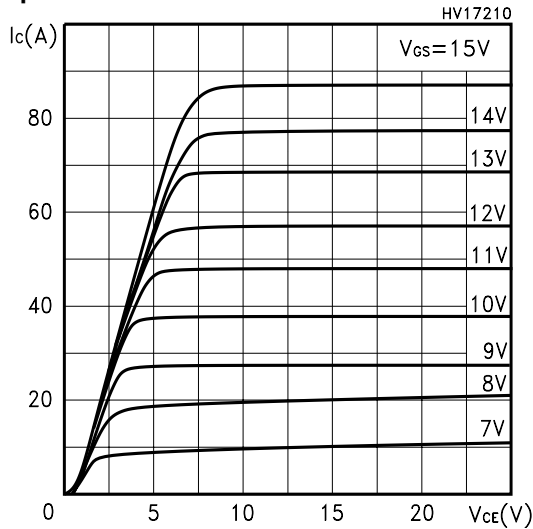
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{CC} = 480\text{ V}$, $I_C = 7\text{ A}$ $R_G = 10\ \Omega$ $V_{GE} = 15\text{ V}$		13 6		ns ns
$(di/dt)_{on}$ E_{on}	Turn-on Current Slope Turn-on Switching Losses	$V_{CC} = 480\text{ V}$, $I_C = 7\text{ A}$ $R_G = 10\ \Omega$ $V_{GE} = 15\text{ V}$, $T_J = 125^\circ\text{C}$		1000 50		A/ μs μJ

SWITCHING OFF

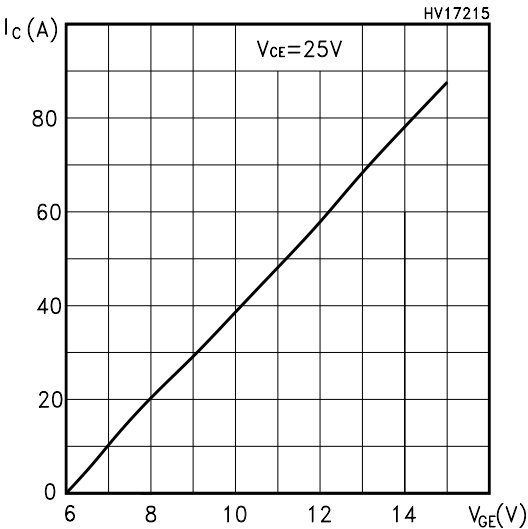
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c $t_r(V_{off})$ $t_{d(off)}$ t_f $E_{off(**)}$ E_{ts}	Cross-over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss Total Switching Loss	$V_{CC} = 480\text{ V}$, $I_C = 7\text{ A}$, $R_G = 10\ \Omega$, $V_{GE} = 15\text{ V}$		340 95 155 240 455 500		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			610 215 280 390 870 920		ns ns ns ns μJ μJ

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
2. Pulse width limited by max. junction temperature.
(**) Losses include Also the Tail (Jedec Standardization)

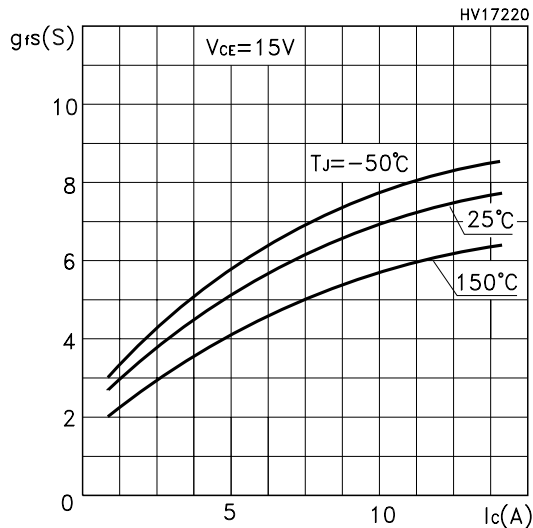
Output Characteristics



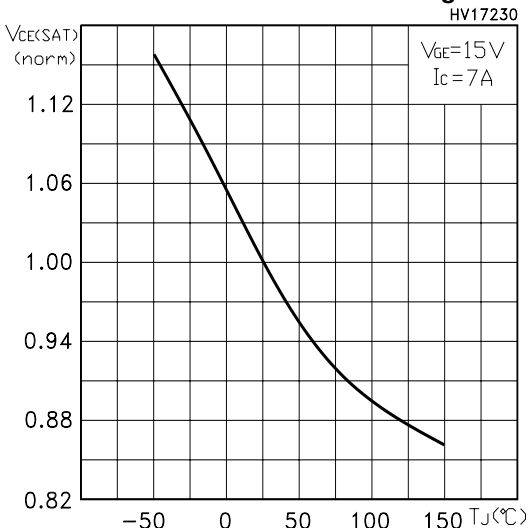
Transfer Characteristics



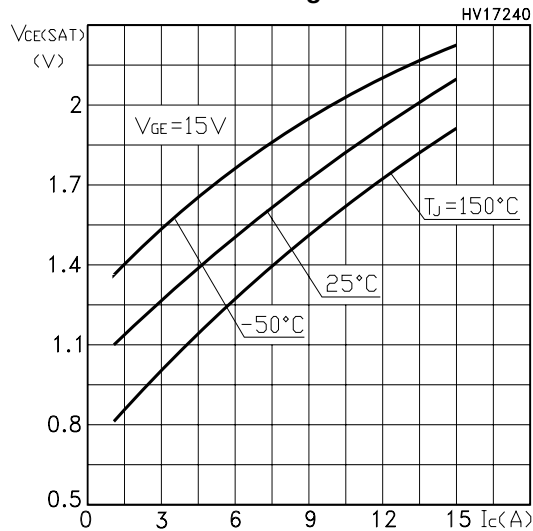
Transconductance



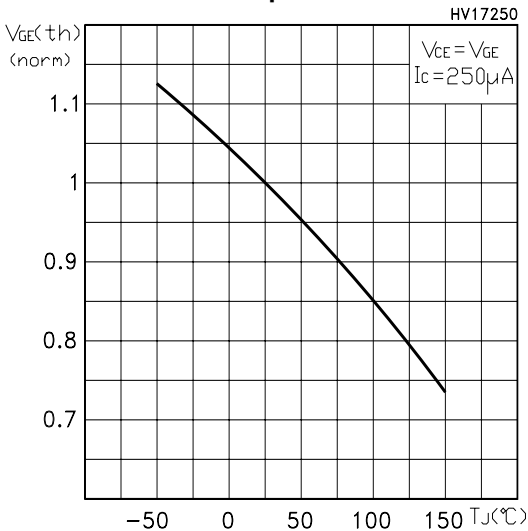
Normalized Collector-Emitter On Voltage vs Temp.



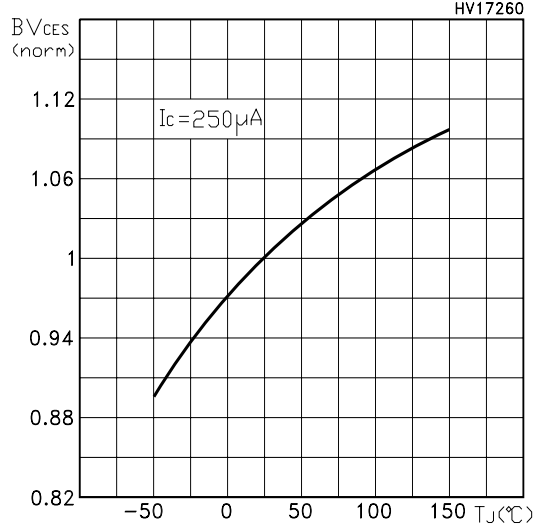
Collector-Emitter On Voltage vs Collector Current



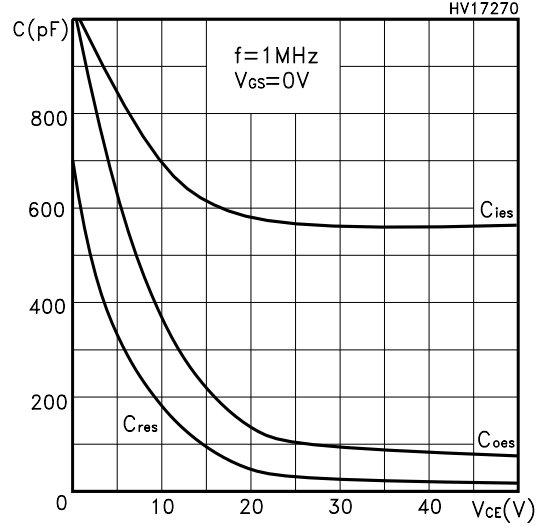
Gate Threshold vs Temperature



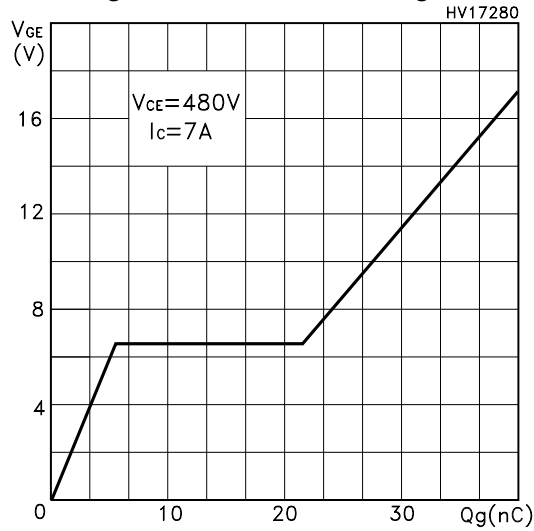
Normalized Breakdown Voltage vs Temperature



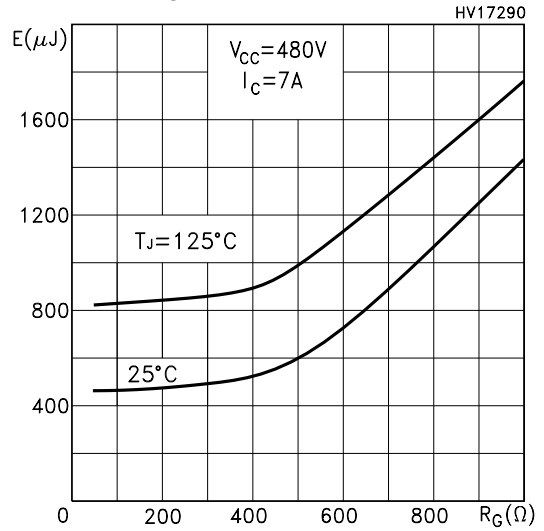
Capacitance Variations



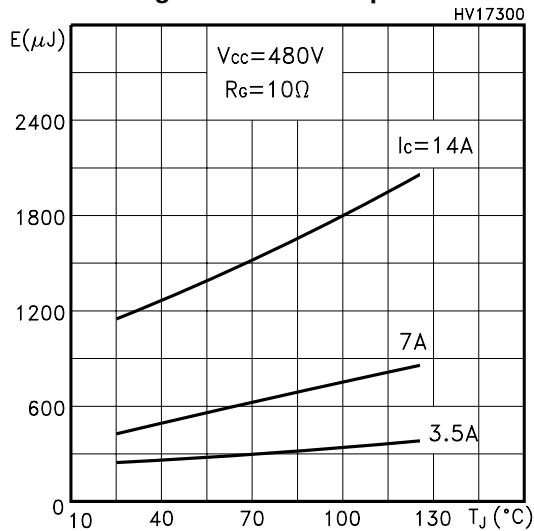
Gate Charge vs Gate-Emitter Voltage



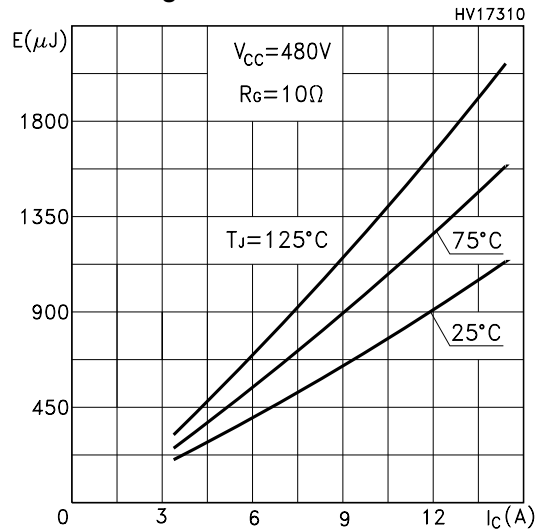
Total Switching Losses vs Gate Resistance



Total Switching Losses vs Temperature

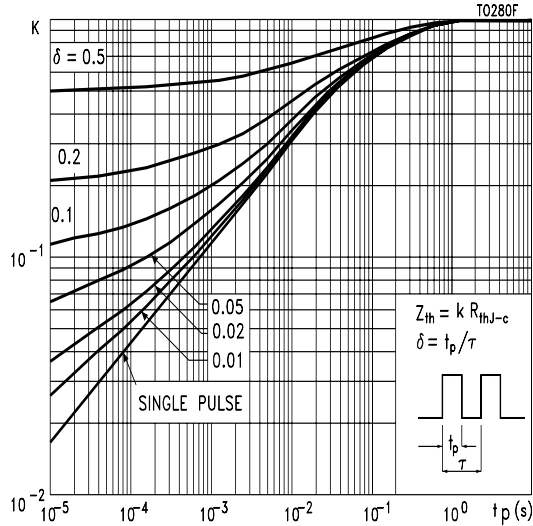


Total Switching Losses vs Collector Current

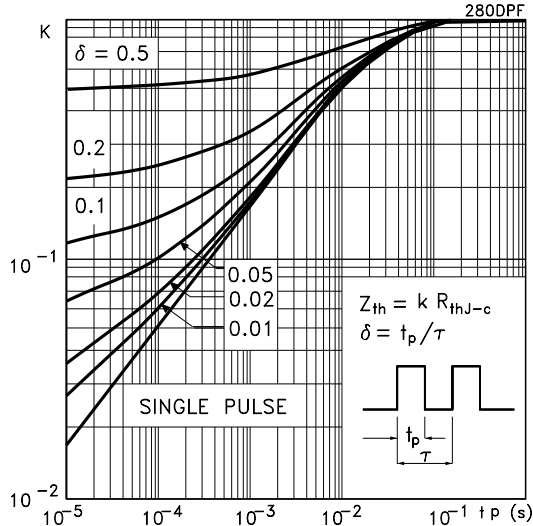


STGP7NB60M - STGD7NB60M

Thermal Impedance for TO-220



Thermal Impedance for DPAK



Turn-Off SOA

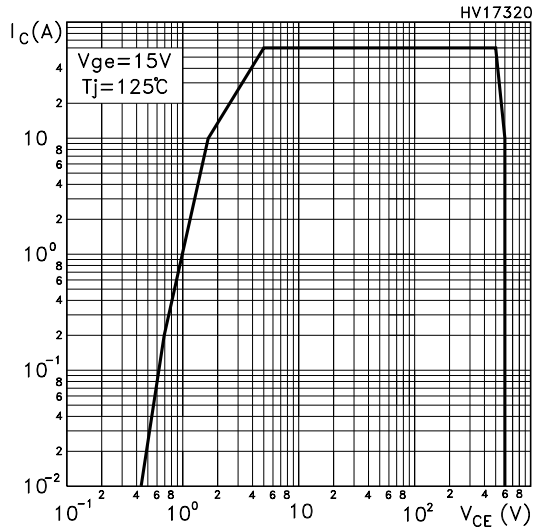


Fig. 1: Gate Charge test Circuit

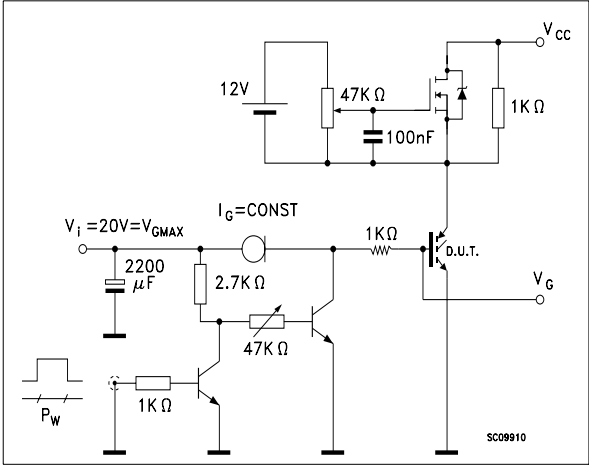
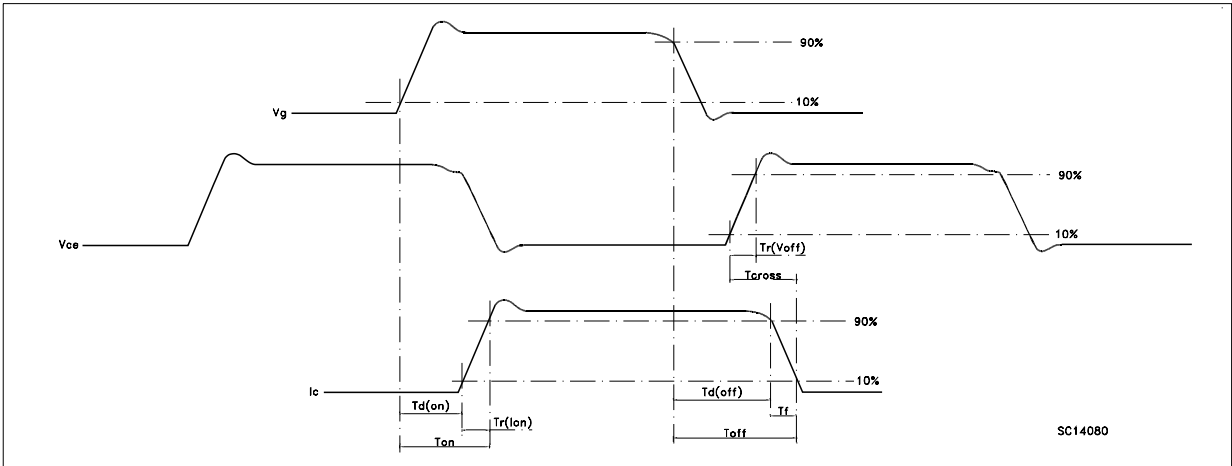
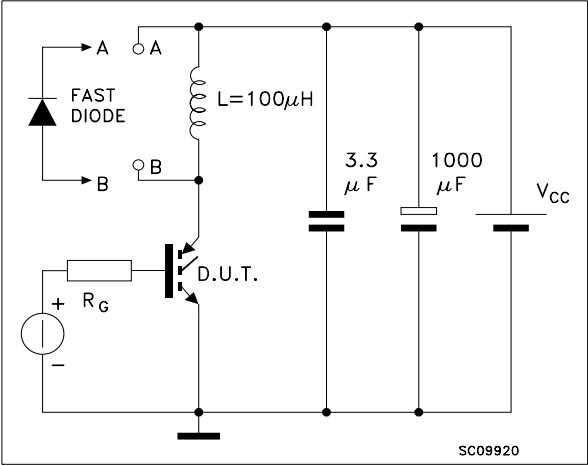
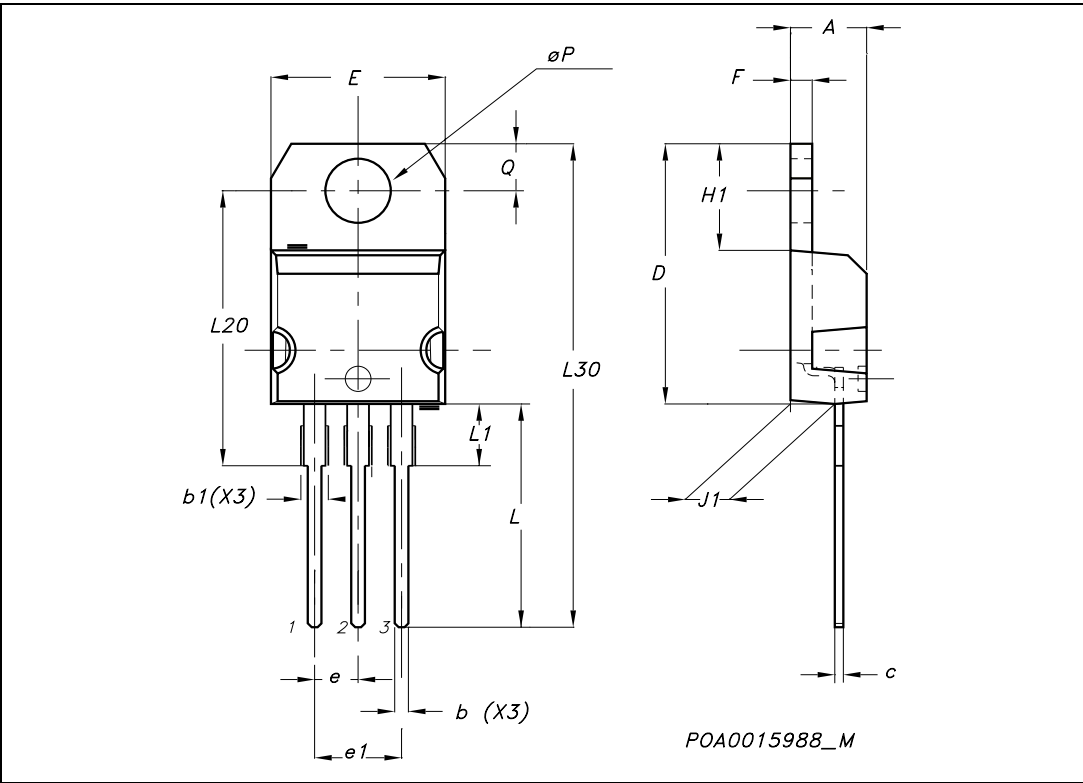


Fig. 2: Test Circuit For Inductive Load Switching



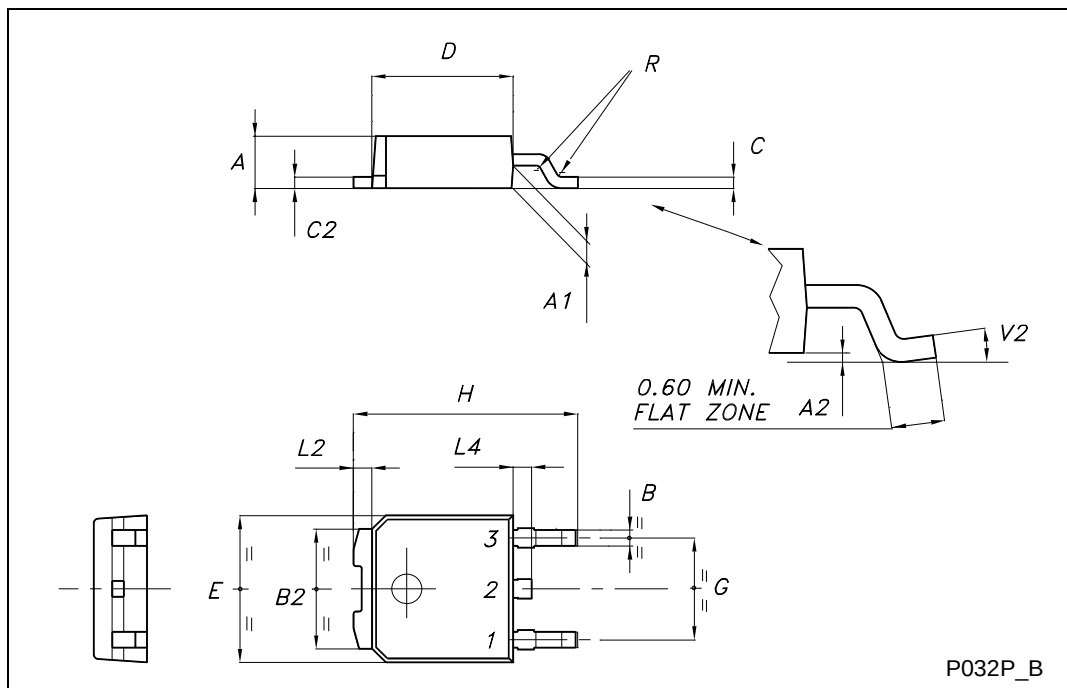
TO-220 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116

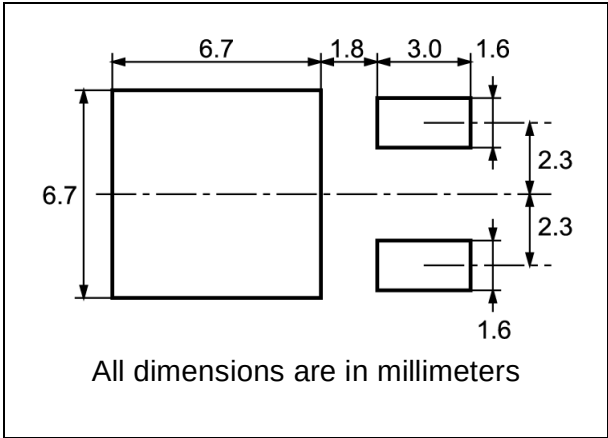


TO-252 (DPAK) MECHANICAL DATA

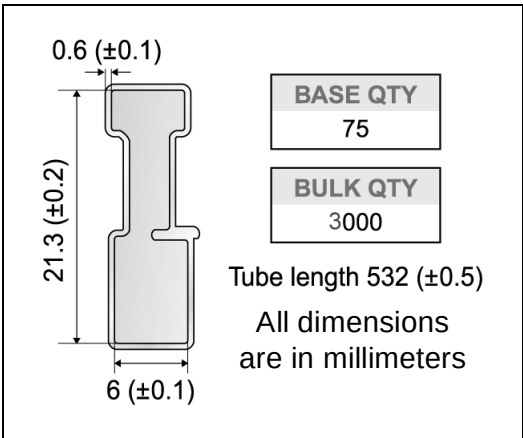
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		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°		8°	0°		0°



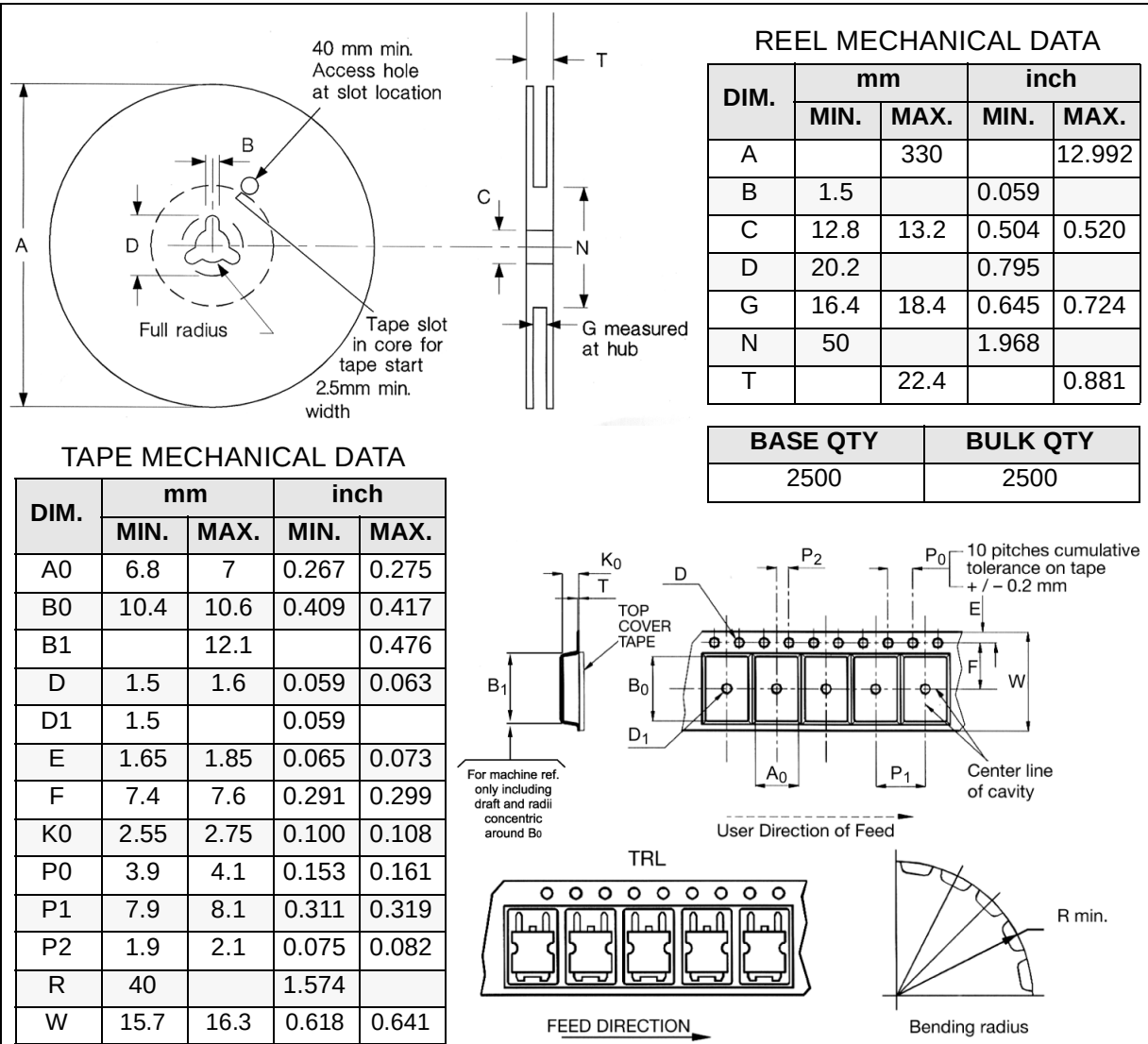
DPAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

© The ST logo is a registered trademark of STMicroelectronics

© 2003 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

© <http://www.st.com>