



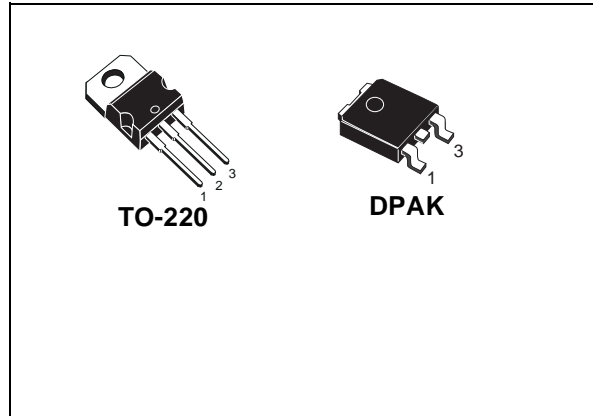
STGP3NB60M - STGD3NB60M

N-CHANNEL 3A - 600V TO-220 / DPAK

PowerMESH™ IGBT

TYPE	V _{CEs}	V _{CE(sat)} (Max) @25°C	I _c @100°C
STGP3NB60M	600 V	< 1.9 V	3 A
STGD3NB60M	600 V	< 1.9 V	3 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

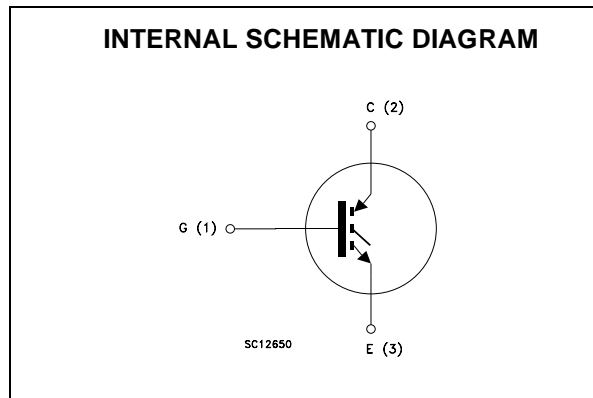


DESCRIPTION

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



ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STGP3NB60M	GP3NB60M	TO-220	TUBE
STGD3NB60MT4	GD3NB60M	DPAK	TAPE & REEL

STGP3NB60M - STGD3NB60M

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 $T_C = 25^\circ\text{C}$	6		A
I_C	Collector Current (continuous) at $T_C = 100^\circ\text{C}$	3		A
I_{CM} (■)	Collector Current (pulsed)	24		A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	68	60	W
	Derating Factor	0.55	0.47	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	
Rthj-case	Thermal Resistance Junction-case Max	1.8	2.1	°C/W
Rthj-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 ($V_{GE} = 0$)	$V_{CE} = \text{Max Rating}$, $T_C = 25^\circ\text{C}$ $V_{CE} = \text{Max Rating}$, $T_C = 125^\circ\text{C}$			50 100	μA 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	$V_{GE} = 15\text{V}$, $I_C = 3\ \text{A}$ $V_{GE} = 15\text{V}$, $I_C = 3\ \text{A}$, $T_j = 125^\circ\text{C}$		1.5 1.2	1.9	V V

ELECTRICAL CHARACTERISTICS (CONTINUED)

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{CE} = 15 \text{ V}, I_C = 3 \text{ A}$		5		S
C_{ies}	Input Capacitance	$V_{CE} = 25 \text{ V}, f = 1 \text{ MHz}, V_{GE} = 0$		240		pF
C_{oes}	Output Capacitance			33		pF
C_{res}	Reverse Transfer Capacitance			6		pF
Q_g Q_{ge} Q_{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	$V_{CE} = 480 \text{ V}, I_C = 3 \text{ A},$ $V_{GE} = 15 \text{ V}$		15 2.2 8	20	nC nC nC
I_{CL}	Latching Current	$V_{clamp} = 480 \text{ V}, V_{GE} = 15 \text{ V}$ $T_J = 125^\circ\text{C}, R_G = 10 \Omega$		20		A

SWITCHING ON

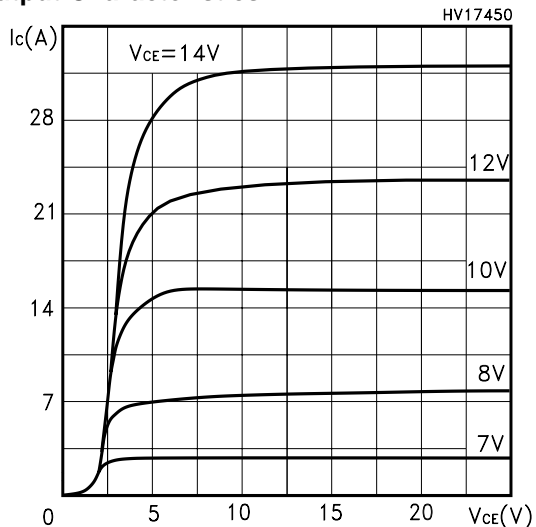
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{CC} = 480 \text{ V}, I_C = 3 \text{ A}, R_G = 10 \Omega,$ $V_{GE} = 15 \text{ V}$		10 4		ns ns
$(di/dt)_{on}$ E_{on}	Turn-on Current Slope Turn-on Switching Losses	$V_{CC} = 480 \text{ V}, I_C = 3 \text{ A}, R_G = 10 \Omega,$ $V_{GE} = 15 \text{ V}, T_J = 125^\circ\text{C}$		570 30		A/ μs μJ

SWITCHING OFF

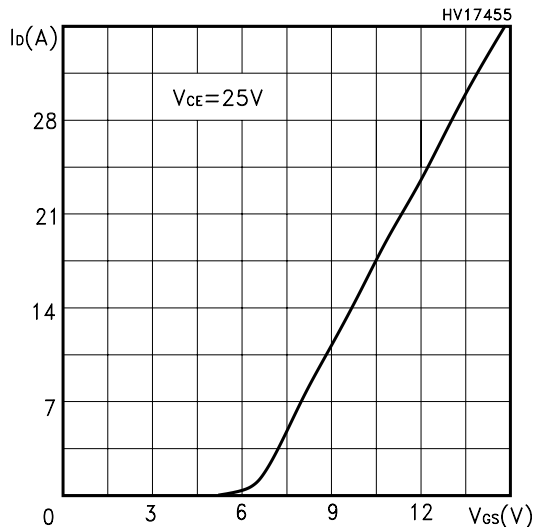
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
t_c $t_r(V_{off})$ $t_{d(off)}$ t_f $E_{off(**)}$ E_{ts}	Cross-over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss Total Switching Loss	$V_{CC} = 480 \text{ V}, I_C = 3 \text{ A},$ $R_G = 10 \Omega, V_{GE} = 15 \text{ V}$		330 85 120 240 175 205		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		$V_{CC} = 480 \text{ V}, I_C = 3 \text{ A},$ $R_G = 10 \Omega, V_{GE} = 15 \text{ V}$ $T_J = 125^\circ\text{C}$		810 270 344 515 458 488		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)

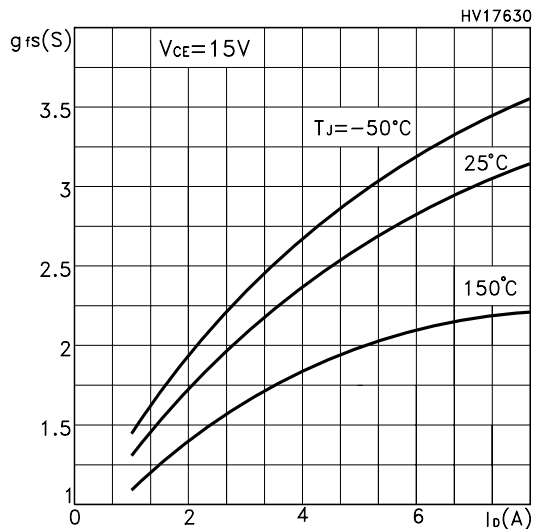
Output Characteristics



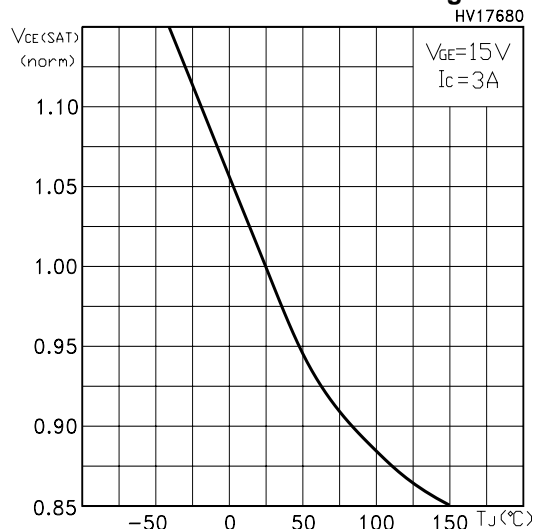
Transfer Characteristics



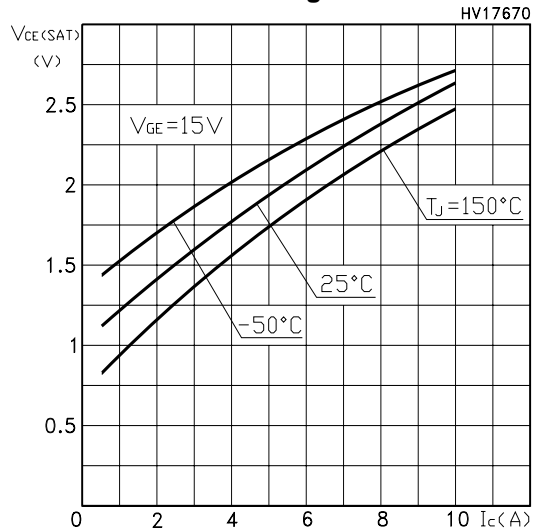
Transconductance



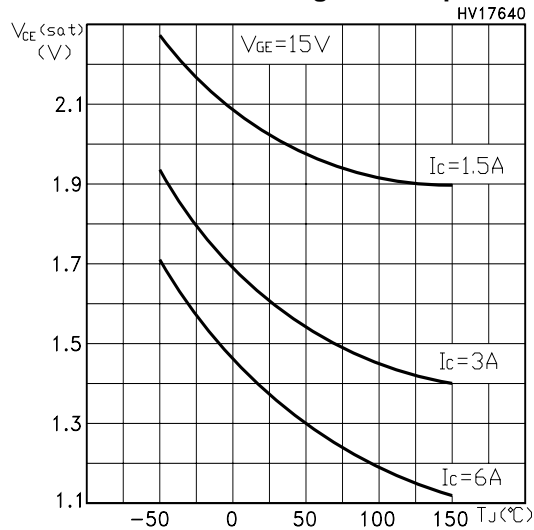
Normalized Collector-Emitter On Voltage vs Temp.



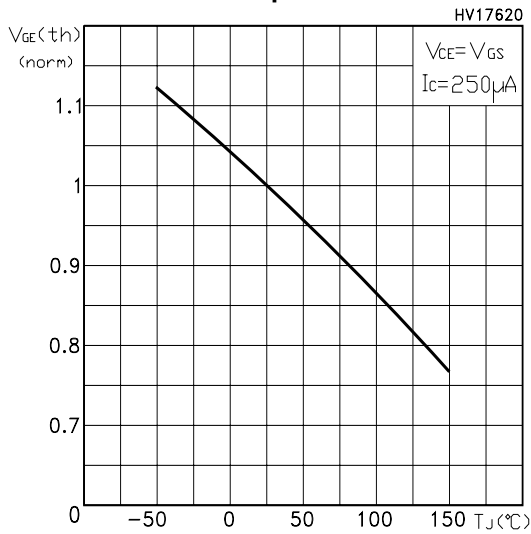
Collector-Emitter On Voltage vs Collector Current



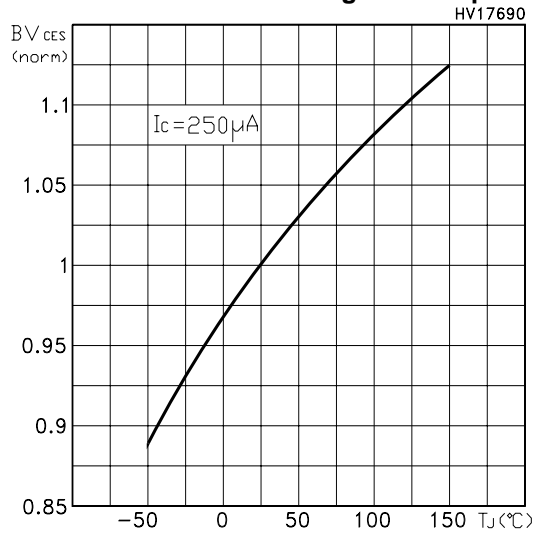
Collector-Emitter On Voltage vs Temperature



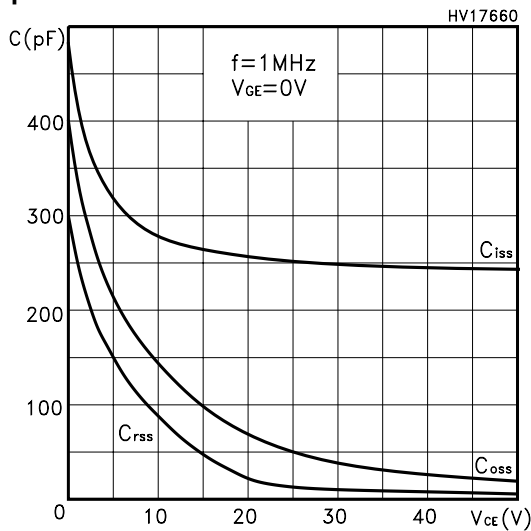
Gate Threshold vs Temperature



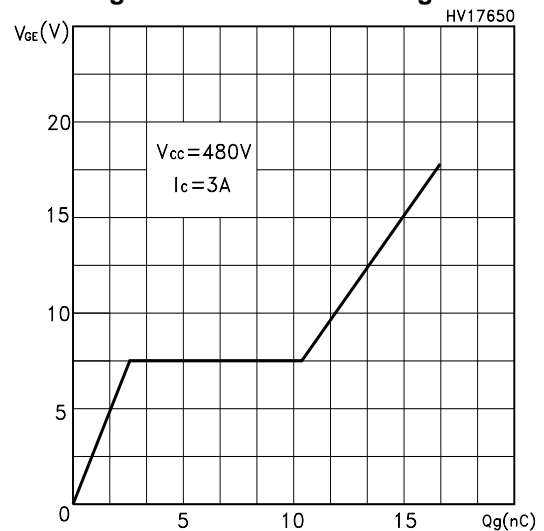
Normalized Breakdown Voltage vs Temperature



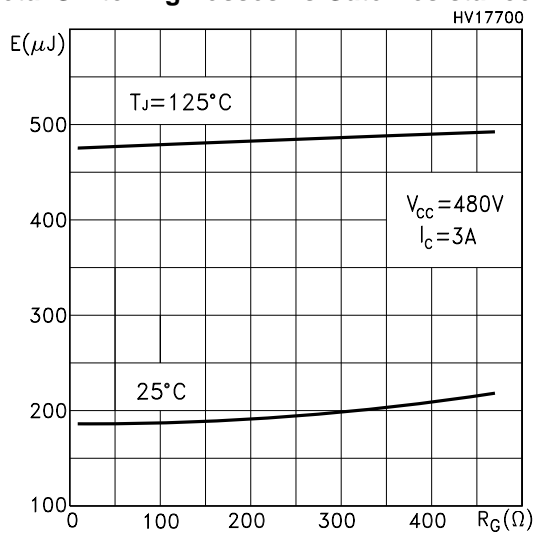
Capacitance Variations



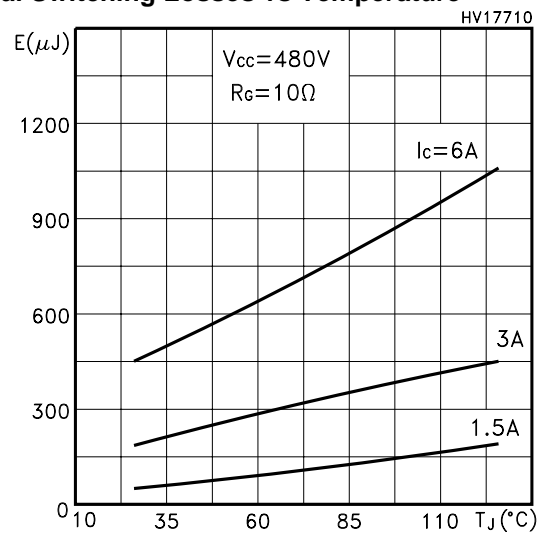
Gate Charge vs Gate-Emitter Voltage



Total Switching Losses vs Gate Resistance

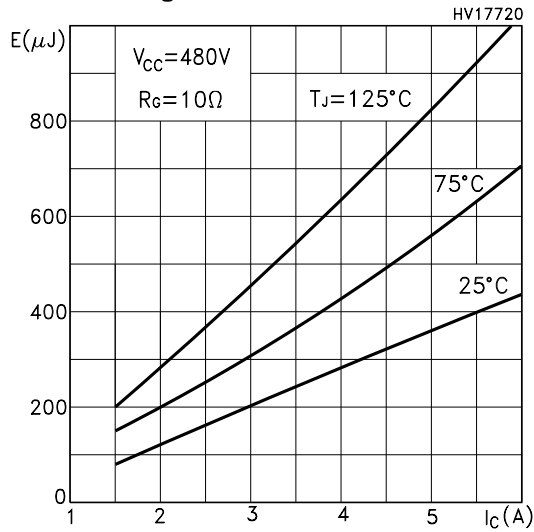


Total Switching Losses vs Temperature

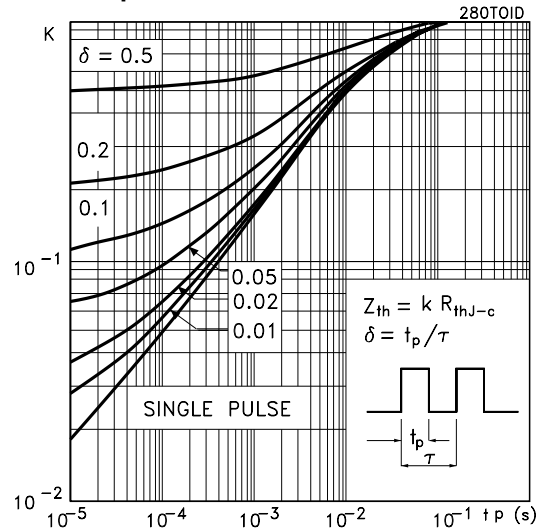


STGP3NB60M - STGD3NB60M

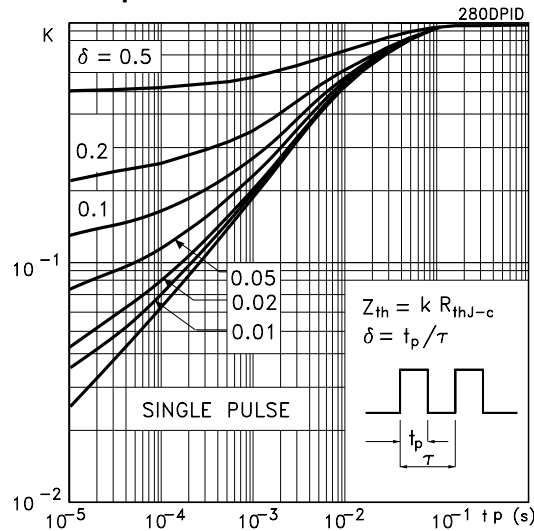
Total Switching Losses vs Collector Current



Thermal Impedance for TO-220



Thermal Impedance for DPAK



Turn-Off SOA

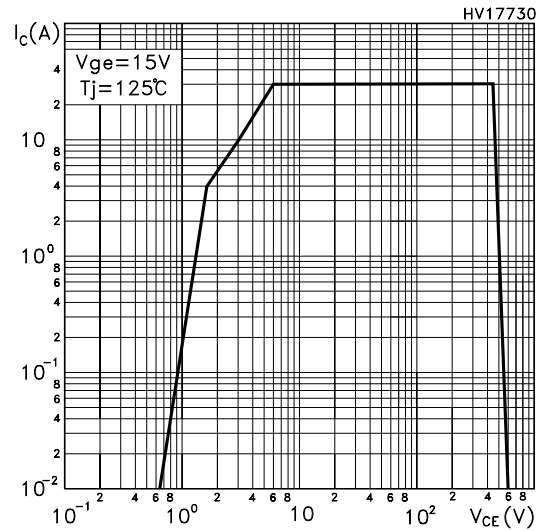


Fig. 1: Gate Charge test Circuit

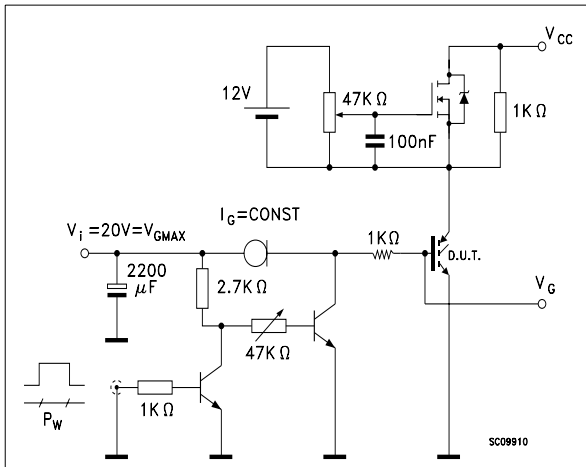
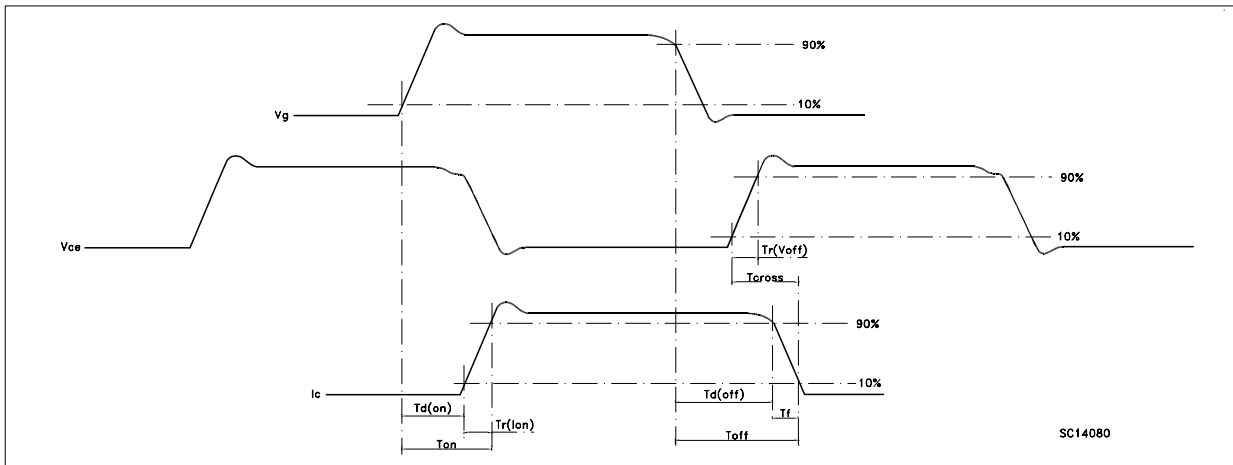
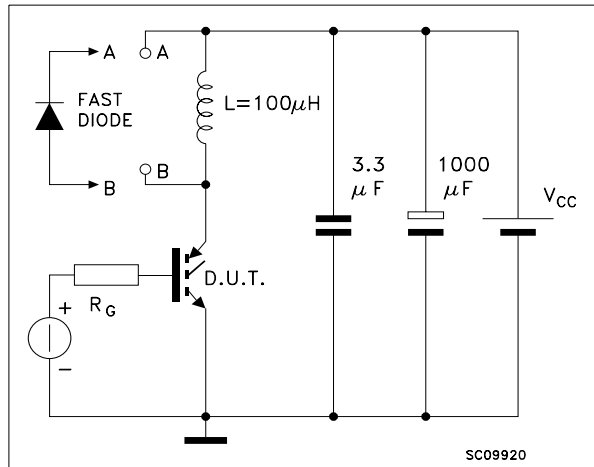
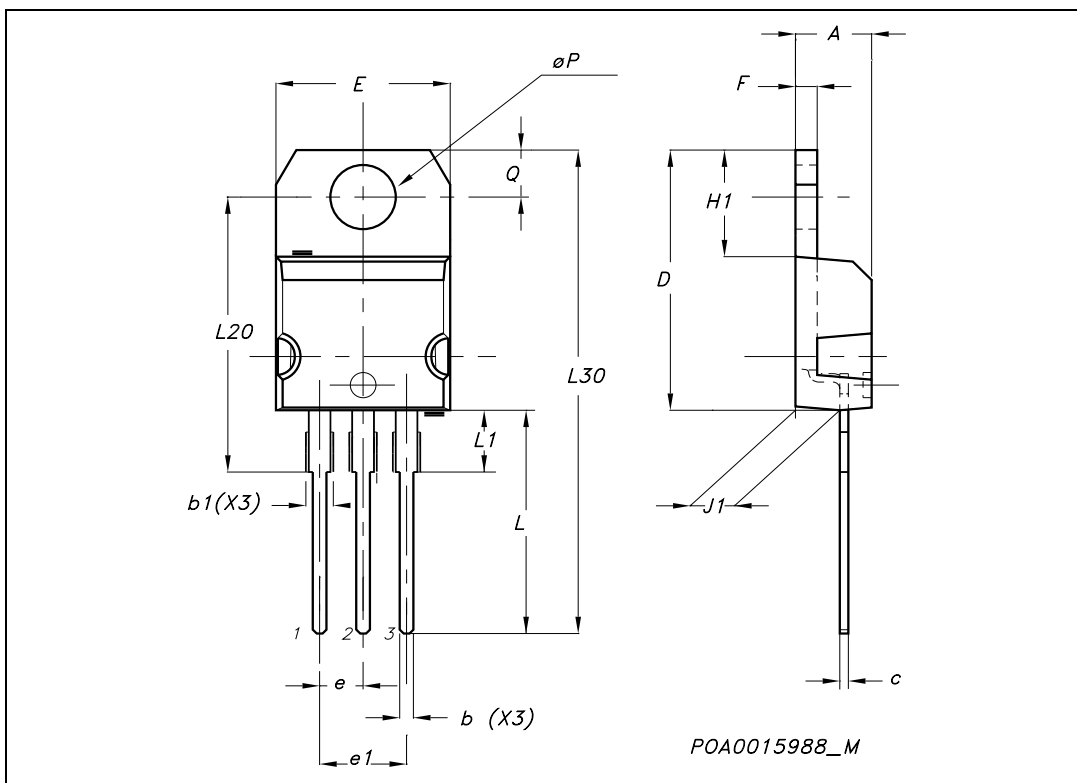


Fig. 2: Test Circuit For Inductive Load Switching



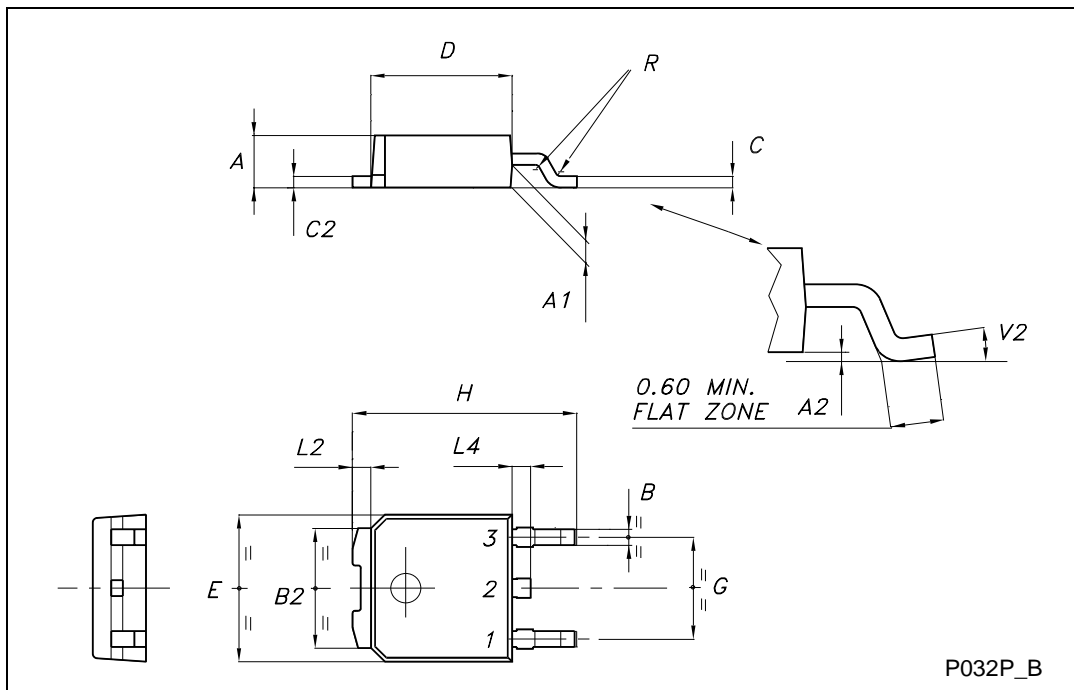
TO-220 MECHANICAL DATA

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

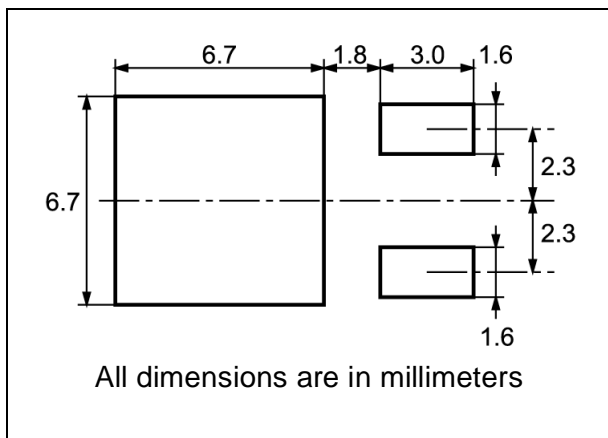


TO-252 (DPAK) MECHANICAL DATA

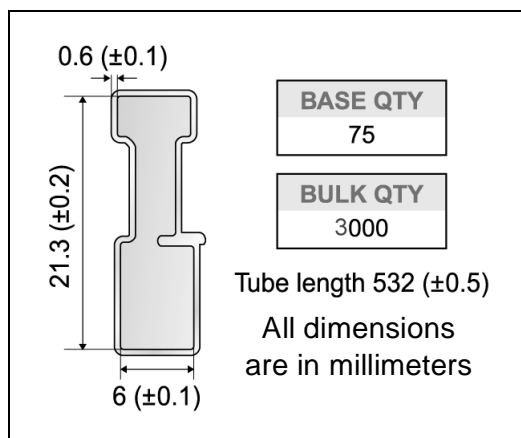
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173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

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 1071



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