



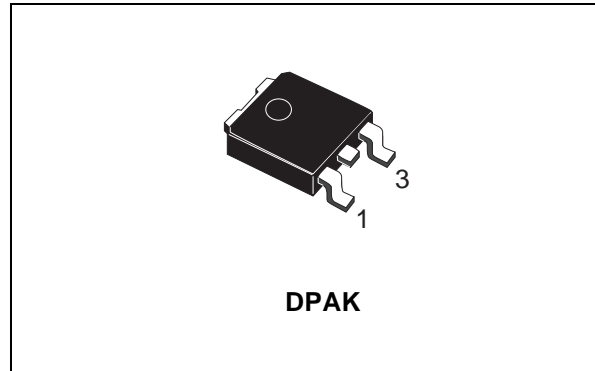
# STGD7NB60H

N-CHANNEL 7A - 600V - DPAK

PowerMESH™ IGBT

TYPE	V <sub>CES</sub>	V <sub>CE(sat)</sub>	I <sub>C</sub>
STD7NB60H	600 V	< 2.8 V	7 A

- HIGH INPUT IMPEDANCE
- LOW ON-VOLTAGE DROP (V<sub>cesat</sub>)
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- VERY HIGH FREQUENCY OPERATION
- CO-PACKAGED WITH TURBOSWITCH
- TYPICAL SHORT CIRCUIT WITHSTAND TIME  
5MICROS S-family, 4 micro H family
- ANTIPARALLEL DIODE



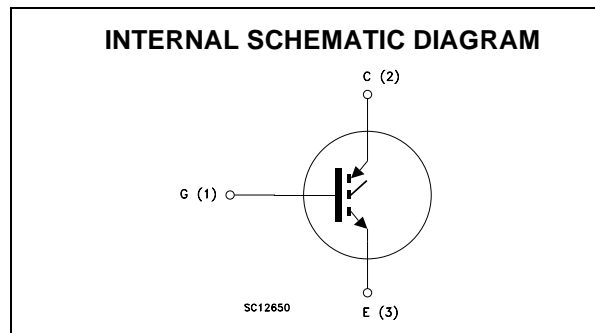
## DESCRIPTION

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 "H" identifies a family optimized for high frequency applications (up to 50kHz) in order to achieve very high switching performances (reduced t<sub>fall</sub>) maintaining a low voltage drop.

## APPLICATIONS

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



## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CES</sub>	Collector-Emitter Voltage (V <sub>GS</sub> = 0)	600	V
V <sub>ECR</sub>	Emitter-Collector Voltage	20	V
V <sub>GE</sub>	Gate-Emitter Voltage	± 20	V
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 25°C	14	A
I <sub>C</sub>	Collector Current (continuous) at T <sub>C</sub> = 100°C	7	A
I <sub>CM</sub> (■)	Collector Current (pulsed)	56	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	55	W
	Derating Factor	0.44	W/°C
T <sub>stg</sub>	Storage Temperature	-65 to 150	°C
T <sub>j</sub>	Max. Operating Junction Temperature	150	°C

## STGD7NB60H

### THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	2.27	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°C/W
Rthc-sink	Thermal Resistance Case-sink Typ	1.5	°C/W

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

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>BR(CES)</sub>	Collectro-Emitter Breakdown Voltage	I <sub>C</sub> = 250 μA, V <sub>GE</sub> = 0	600			V
I <sub>CES</sub>	Collector cut-off (V <sub>GE</sub> = 0)	V <sub>CE</sub> = Max Rating, T <sub>C</sub> = 25 °C V <sub>CE</sub> = Max Rating, T <sub>C</sub> = 125 °C			10 100	μA μA
I <sub>GES</sub>	Gate-Emitter Leakage Current (V <sub>CE</sub> = 0)	V <sub>GE</sub> = ± 20V, V <sub>CE</sub> = 0			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>GE(th)</sub>	Gate Threshold Voltage	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 250μA	3		5	V
V <sub>CE(sat)</sub>	Collector-Emitter Saturation Voltage	V <sub>GE</sub> = 15V, I <sub>C</sub> = 7 A V <sub>GE</sub> = 15V, I <sub>C</sub> = 7 A, T <sub>J</sub> = 125°C		2.3 1.9	2.8	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g <sub>fs</sub>	Forward Transconductance	V <sub>CE</sub> = 25 V, I <sub>C</sub> = 3 A	3.5	5		S
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 25V, f = 1 MHz, V <sub>GE</sub> = 0		560		pF
C <sub>oes</sub>	Output Capacitance			68		pF
C <sub>res</sub>	Reverse Transfer Capacitance			15		pF
Q <sub>g</sub> Q <sub>ge</sub> Q <sub>gc</sub>	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V <sub>CE</sub> = 480V, I <sub>C</sub> = 7 A, V <sub>GE</sub> = 15V		42 7.9 17.6	55	nC nC nC
I <sub>CL</sub>	Latching Current	V <sub>clamp</sub> = 480 V, T <sub>J</sub> = 150°C R <sub>G</sub> = 10 Ω	28			A

SWITCHING ON

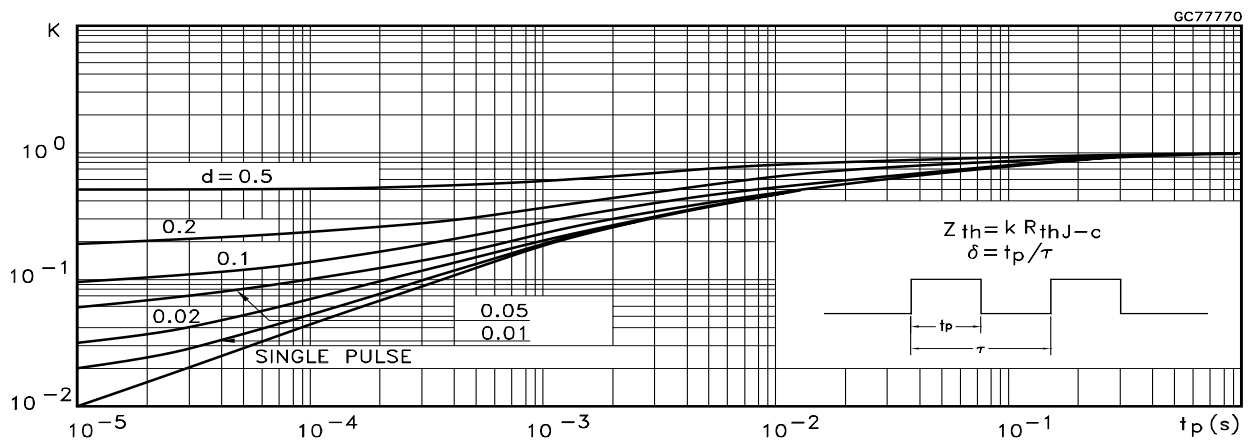
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t <sub>d(on)</sub> t <sub>r</sub>	Turn-on Delay Time Rise Time	V <sub>CC</sub> = 480 V, I <sub>C</sub> = 7 A R <sub>G</sub> = 10Ω, V <sub>GE</sub> = 15 V		15 48		ns ns
(di/dt) <sub>on</sub> E <sub>on</sub>	Turn-on Current Slope Turn-on Switching Losses	V <sub>CC</sub> = 480 V, I <sub>C</sub> = 7 A R <sub>G</sub> = 10Ω V <sub>GE</sub> = 15 V, T <sub>J</sub> = 125°C		160 70		A/μs μJ

**ELECTRICAL CHARACTERISTICS (CONTINUED)**  
**SWITCHING OFF**

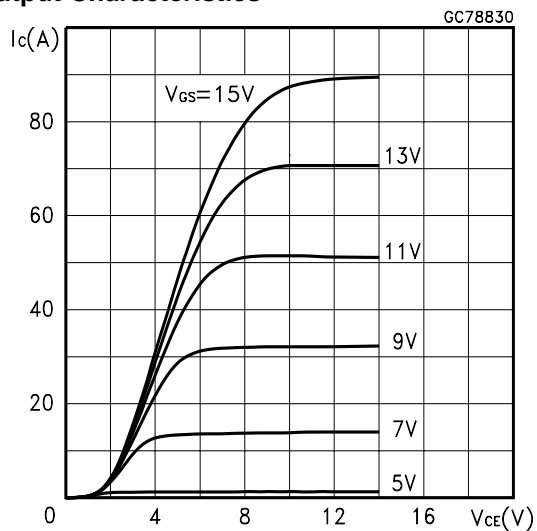
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_c$	Cross-over Time	$V_{CC} = 480\text{ V}$ , $I_C = 7\text{ A}$ , $R_{GE} = 10\ \Omega$ , $V_{GE} = 15\text{ V}$		85		ns
$t_r(V_{off})$	Off Voltage Rise Time			20		ns
$t_{d(off)}$	Delay Time			75		ns
$t_f$	Fall Time			70		ns
$E_{off(**)}$	Turn-off Switching Loss				85	$\mu\text{J}$
$E_{ts}$	Total Switching Loss				130	$\mu\text{J}$
$t_c$	Cross-over Time	$V_{CC} = 480\text{ V}$ , $I_C = 3\text{ A}$ , $R_{GE} = 10\ \Omega$ , $V_{GE} = 15\text{ V}$ , $T_j = 125\text{ }^\circ\text{C}$		150		ns
$t_r(V_{off})$	Off Voltage Rise Time			50		ns
$t_{d(off)}$	Delay Time			110		ns
$t_f$	Fall Time			110		ns
$E_{off(**)}$	Turn-off Switching Loss				220	$\mu\text{J}$
$E_{ts}$	Total Switching Loss				290	$\mu\text{J}$

Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.  
 2. Pulse width limited by max. junction temperature.  
 (\*\*) Losses include Also the Tail (Jedec Standardization)

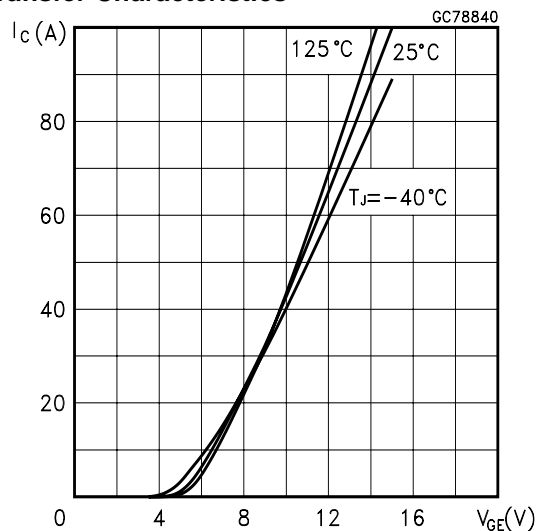
**Thermal Impedance**



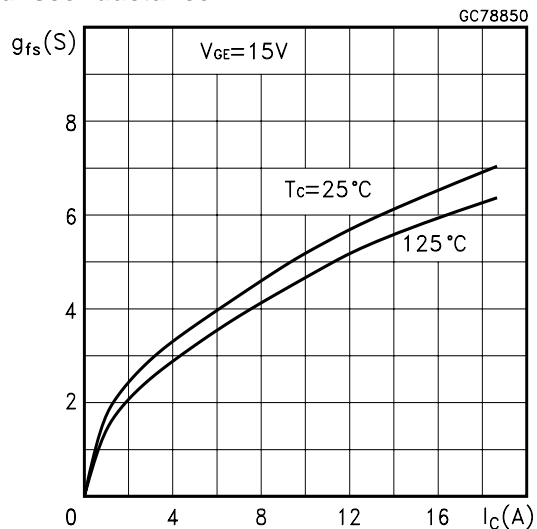
Output Characteristics



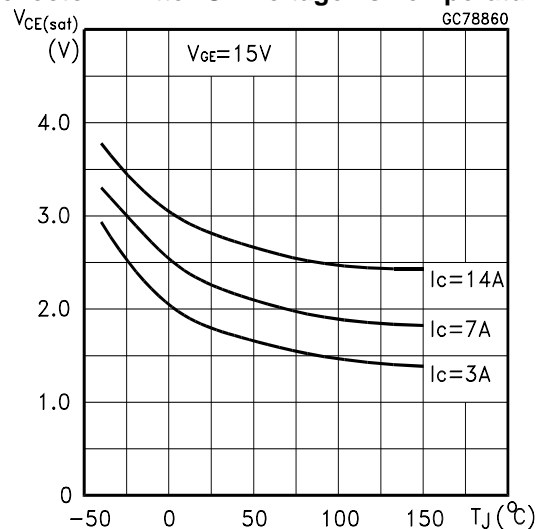
Transfer Characteristics



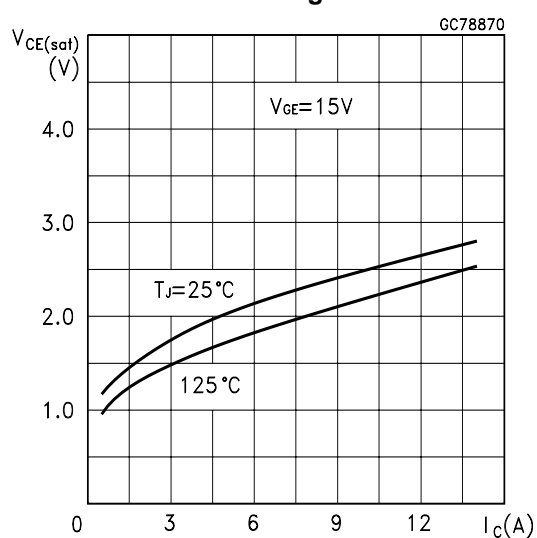
Transconductance



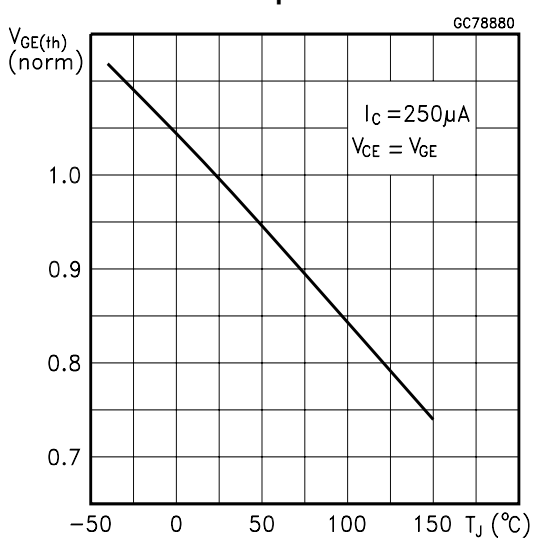
Collector-Emitter On Voltage vs Temperature



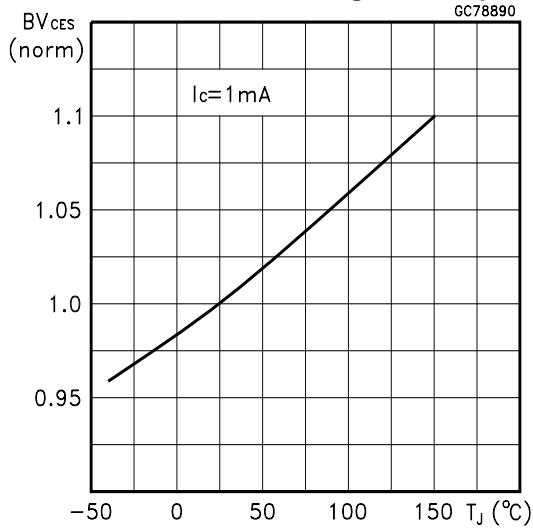
Collector-Emitter On Voltage vs Collector Current



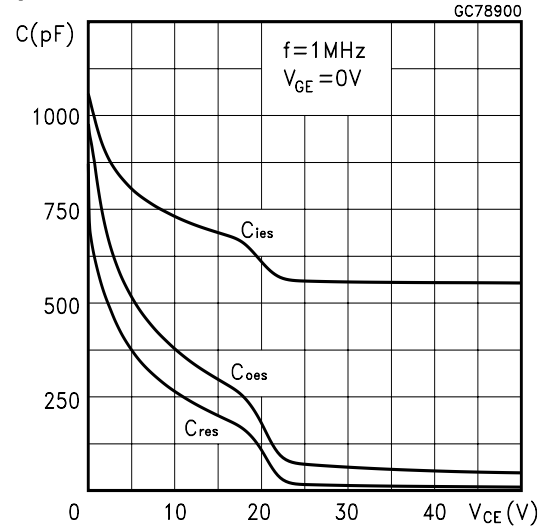
Gate Threshold vs Temperature



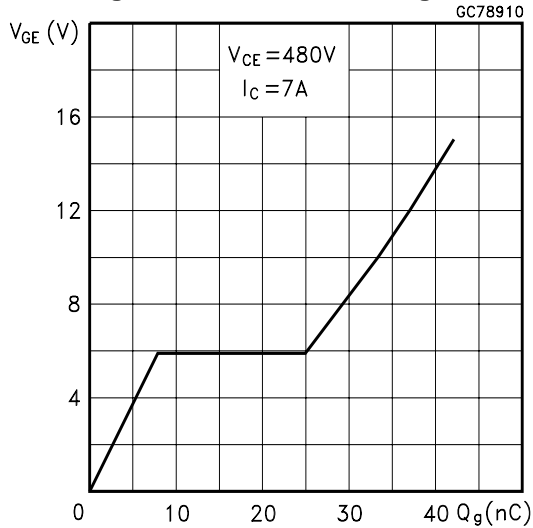
Normalized Breakdown Voltage vs Temperature



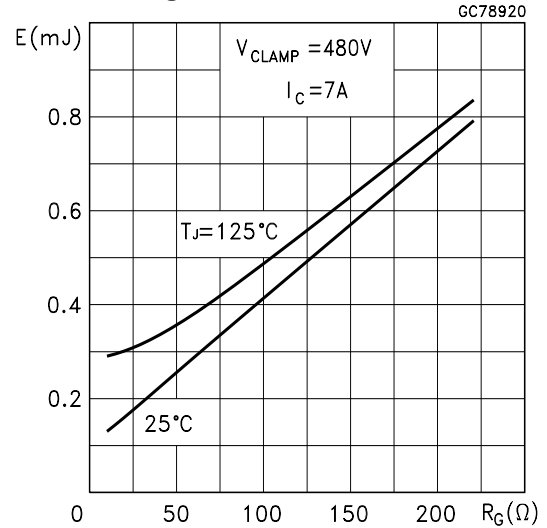
Capacitance Variations



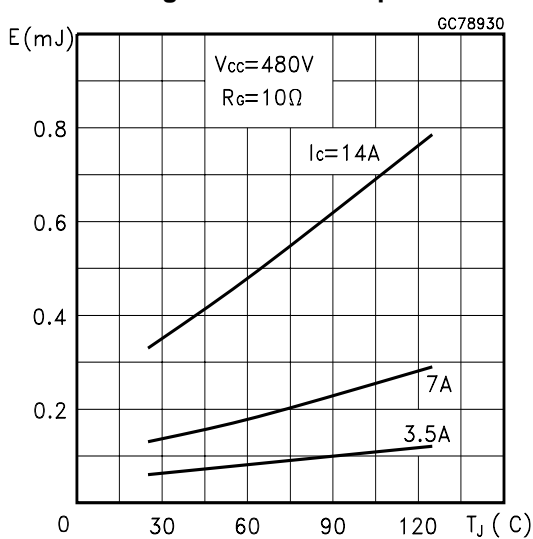
Gate Charge vs Gate-Emitter Voltage



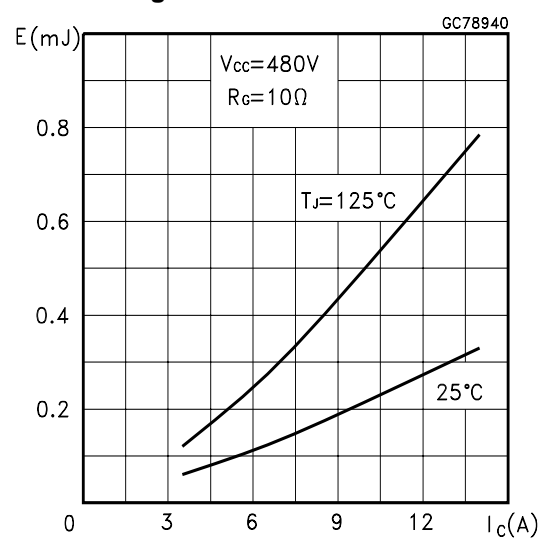
Total Switching Losses vs Gate Resistance



Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Switching Off Safe Operating Area

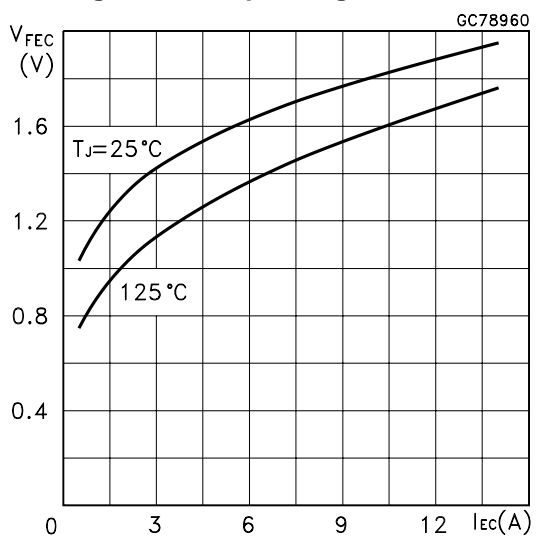


Fig. 1: Gate Charge test Circuit

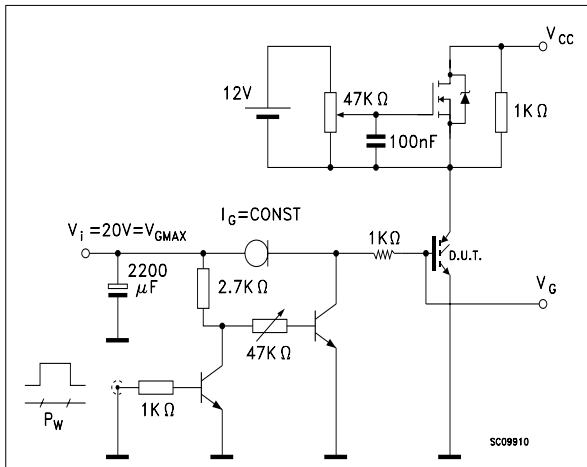
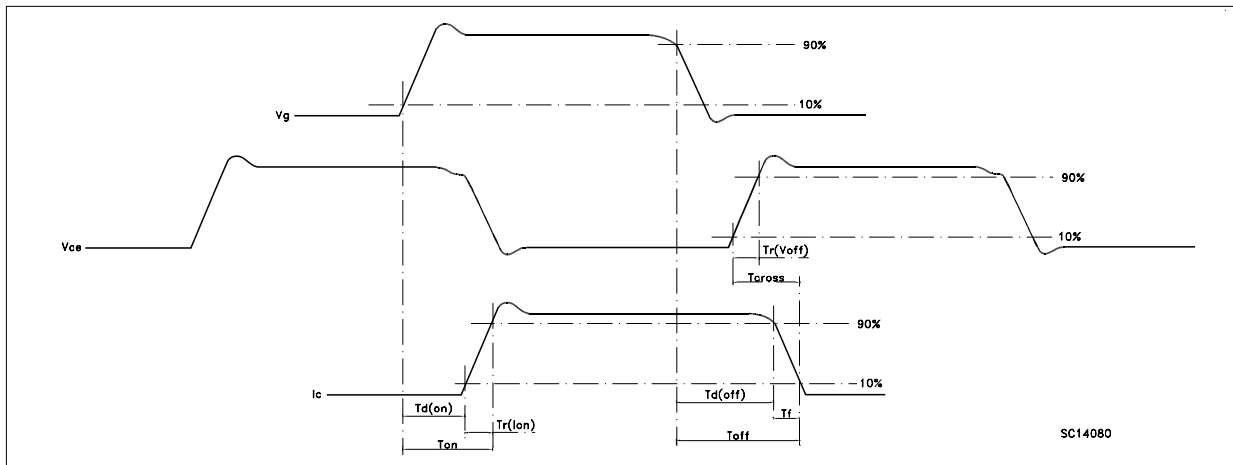
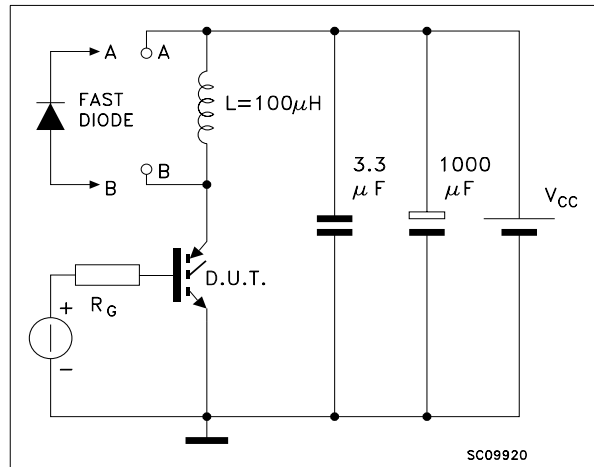
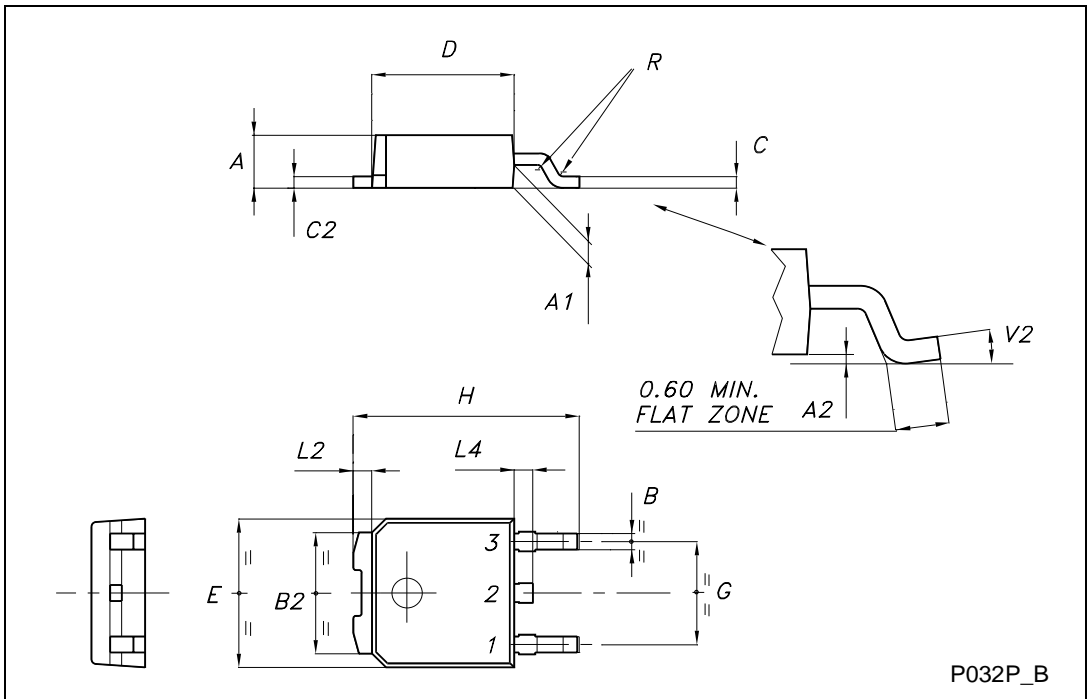


Fig. 2: Test Circuit For Inductive Load Switching



**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°





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