



STGD7NB60H

N-CHANNEL 7A - 600V - DPAK

PowerMESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)}	I _C
STD7NB60H	600 V	< 2.8 V	7 A

- HIGH INPUT IMPEDANCE
- LOW ON-VOLTAGE DROP (V_{cesat})
- 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

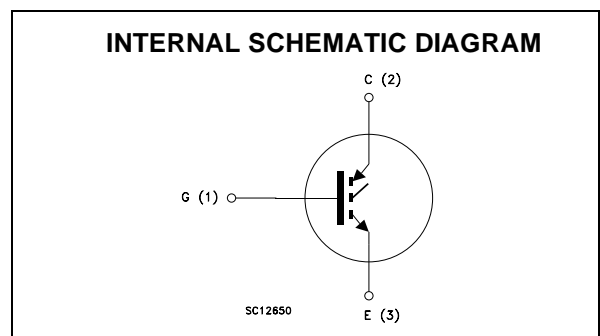
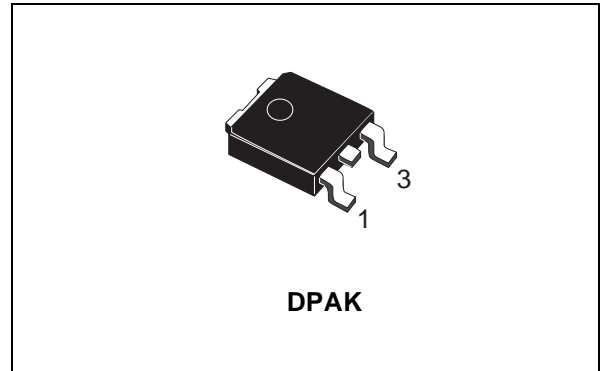
DESCRIPTION

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_{fall}) 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 _{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 (continuous) at T _C = 25°C	14	A
I _C	Collector Current (continuous) at T _C = 100°C	7	A
I _{CM} (■)	Collector Current (pulsed)	56	A
P _{TOT}	Total Dissipation at T _C = 25°C	55	W
	Derating Factor	0.44	W/°C
T _{stg}	Storage Temperature	-65 to 150	°C
T _j	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 _{BR} (CES)	Collectro-Emitter Breakdown Voltage	I _C = 250 μ A, 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			10 100	μ A μ A
I _{GES}	Gate-Emitter Leakage Current (V _{CE} = 0)	V _{GE} = \pm 20V, V _{CE} = 0			\pm 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 μ A	3		5	V
V _{CE} (sat)	Collector-Emitter Saturation Voltage	V _{GE} = 15V, I _C = 7 A V _{GE} = 15V, I _C = 7 A, T _J = 125°C		2.3 1.9	2.8	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} = 25 V, I _C = 3 A	3.5	5		S
C _{ies}	Input Capacitance	V _{CE} = 25V, f = 1 MHz, V _{GE} = 0		560		pF
C _{oes}	Output Capacitance			68		pF
C _{res}	Reverse Transfer Capacitance			15		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		42 7.9 17.6	55	nC nC nC
I _{CL}	Latching Current	V _{clamp} = 480 V, T _J = 150°C R _G = 10 Ω	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 V, I _C = 7 A R _G = 10 Ω , V _{GE} = 15 V		15 48		ns ns
(di/dt) _{on} E _{on}	Turn-on Current Slope Turn-on Switching Losses	V _{CC} = 480 V, I _C = 7 A R _G = 10 Ω V _{GE} = 15 V, T _J = 125°C		160 70		A/ μ s μ J

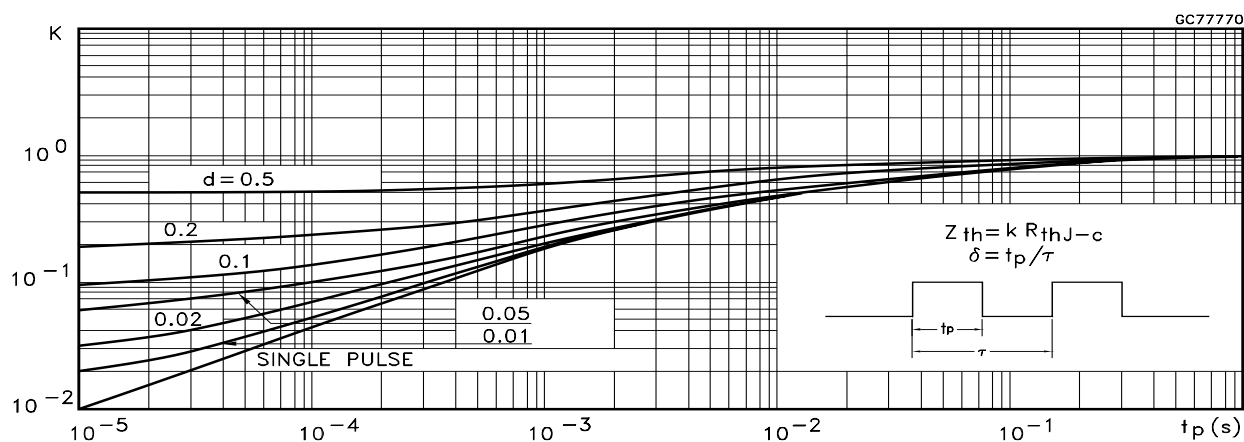
ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING OFF**

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		μJ
E_{ts}	Total Switching Loss			130		μJ
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		μJ
E_{ts}	Total Switching Loss			290		μJ

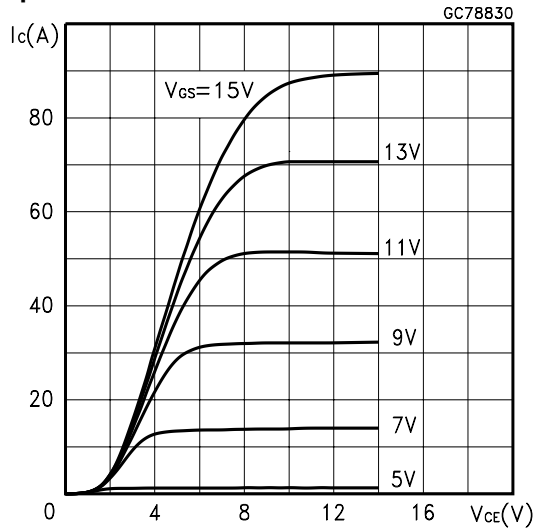
Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

2. Pulse width limited by max. junction temperature.

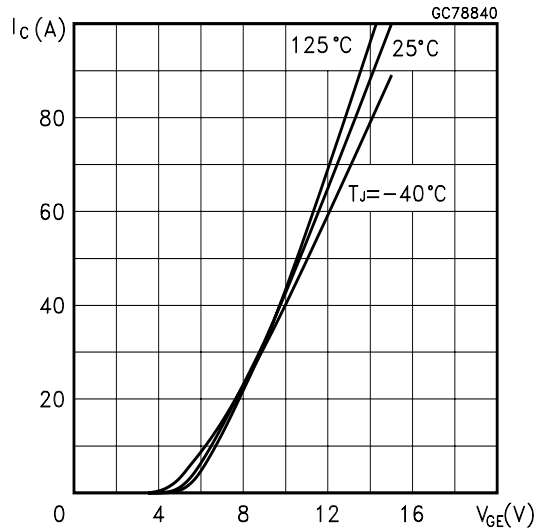
(**) Losses include Also the Tail (Jedec Standardization)

Thermal Impedance

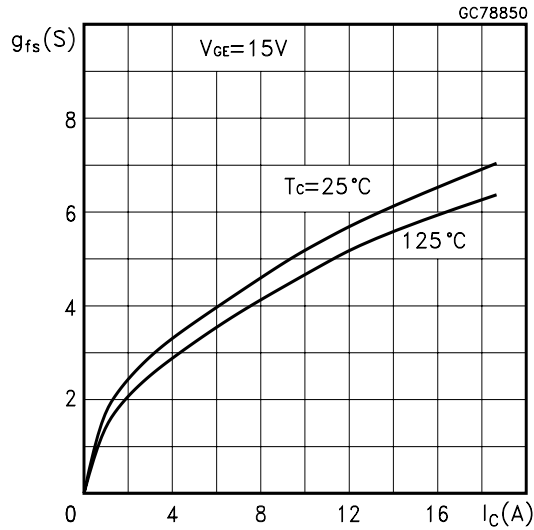
Output Characteristics



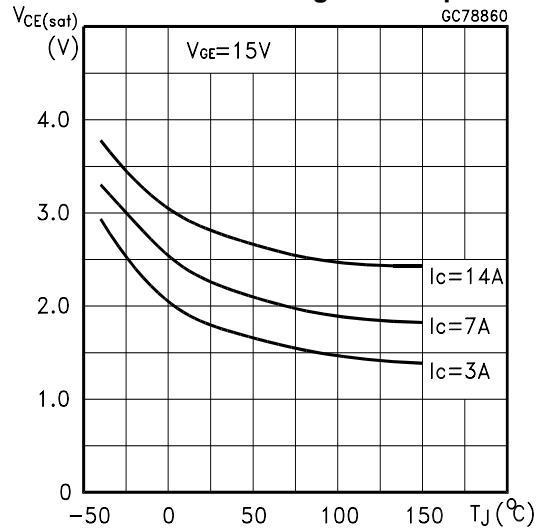
Transfer Characteristics



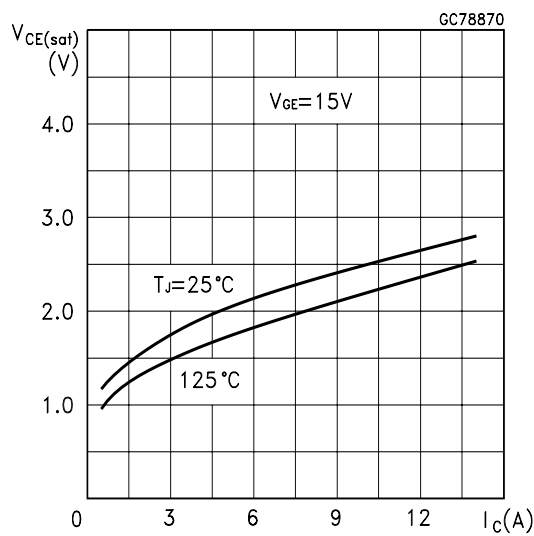
Transconductance



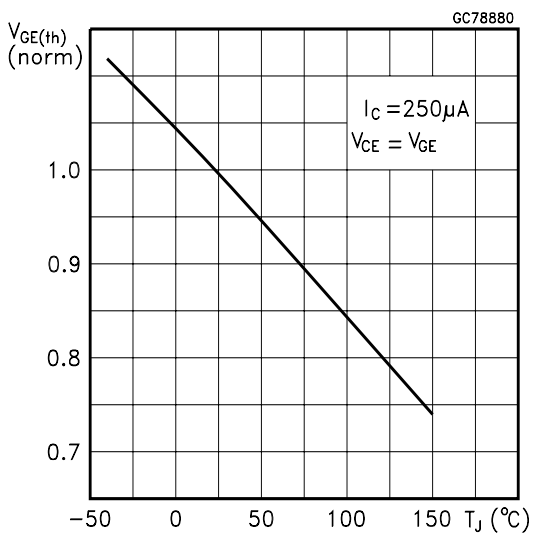
Collector-Emitter On Voltage vs Temperature



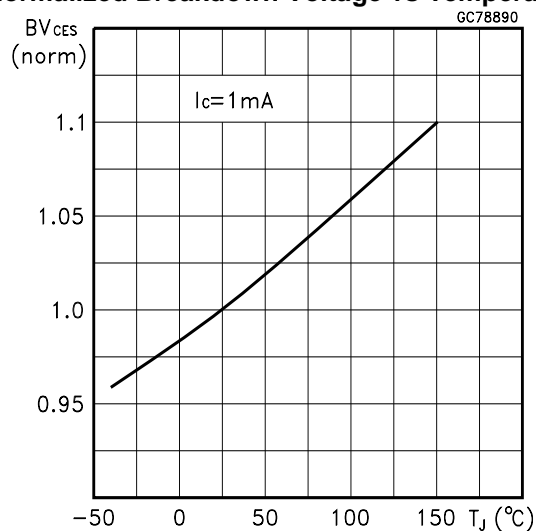
Collector-Emitter On Voltage vs Collector Current



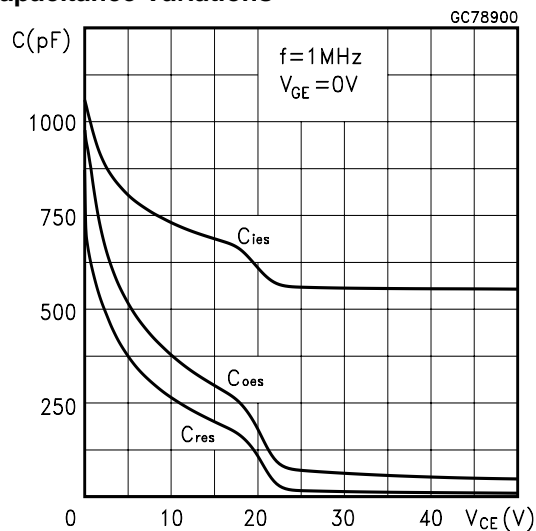
Gate Threshold vs Temperature



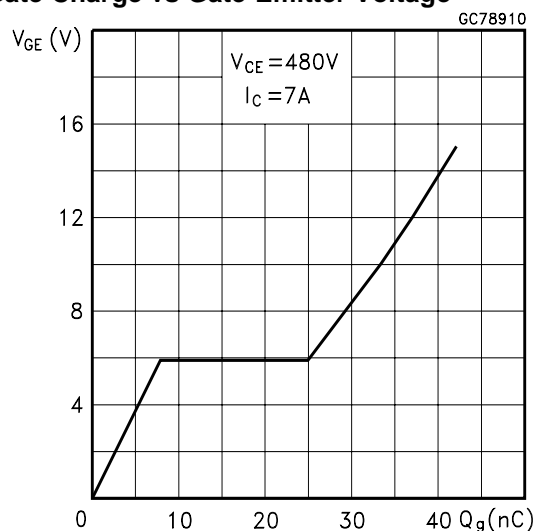
Normalized Breakdown Voltage vs Temperature



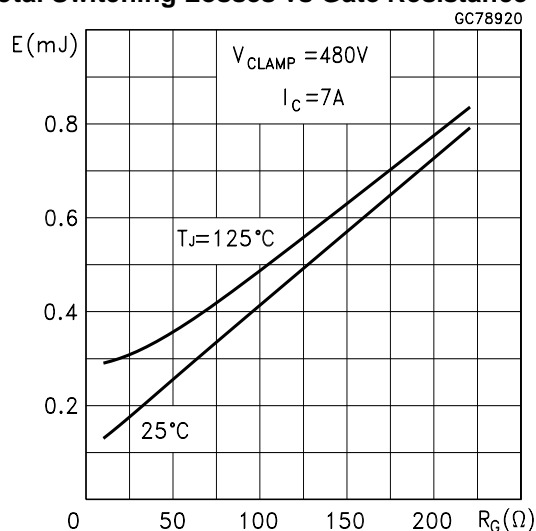
Capacitance Variations



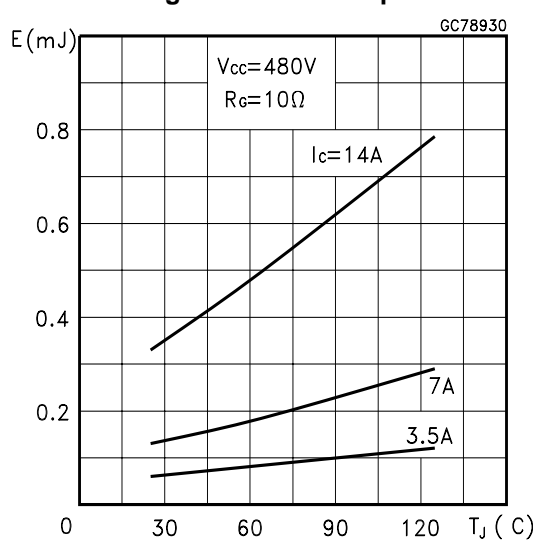
Gate Charge vs Gate-Emitter Voltage



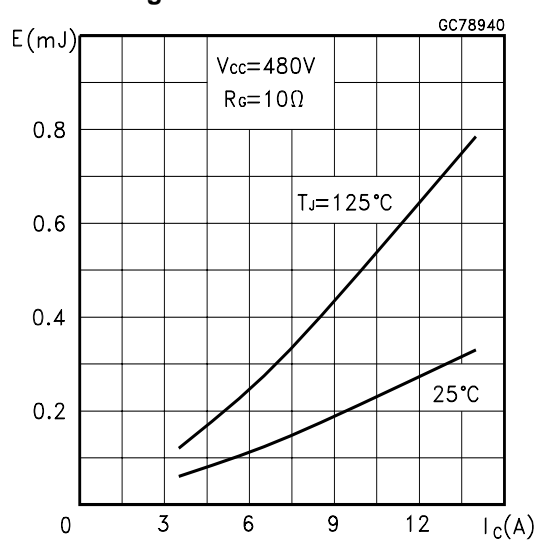
Total Switching Losses vs Gate Resistance



Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Switching Off Safe Operating Area

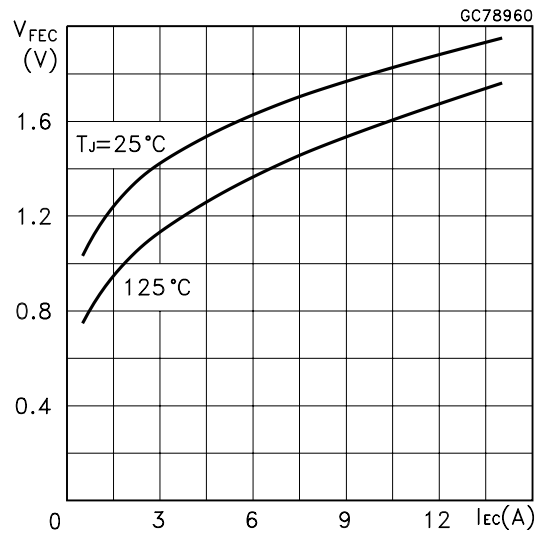
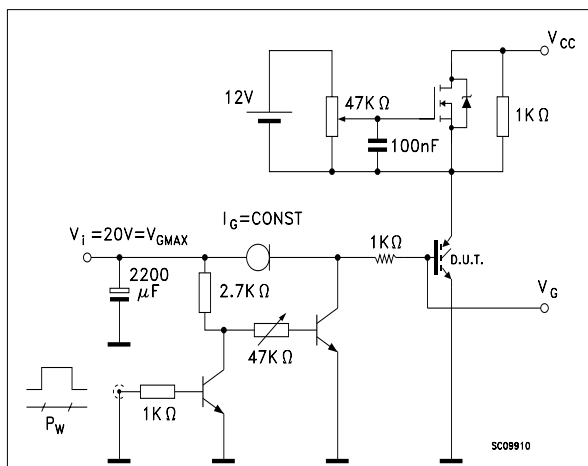
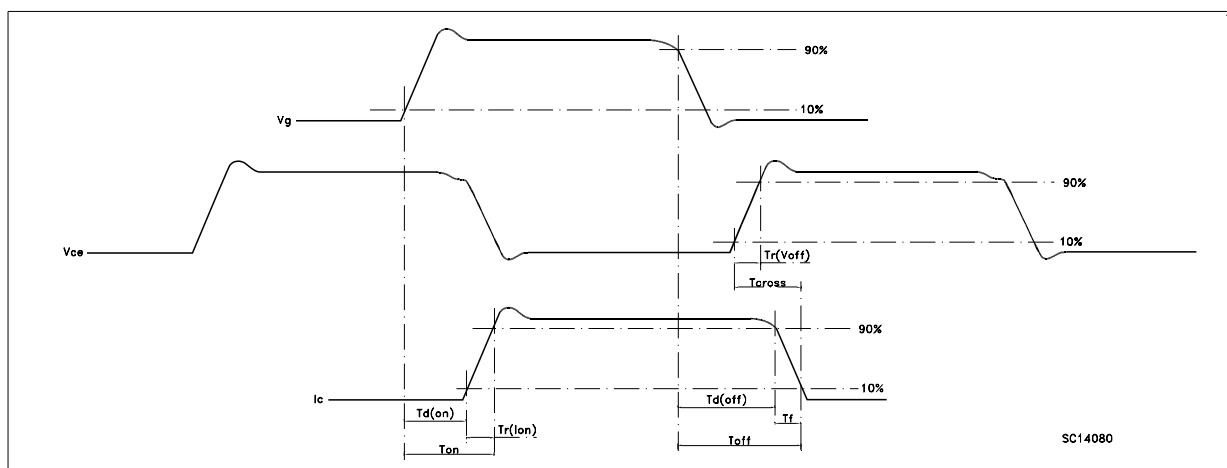
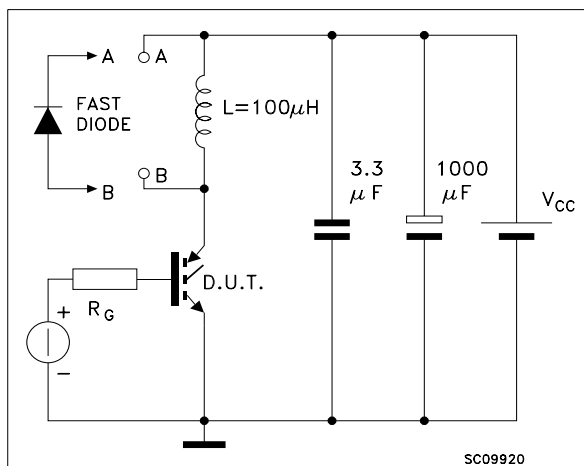
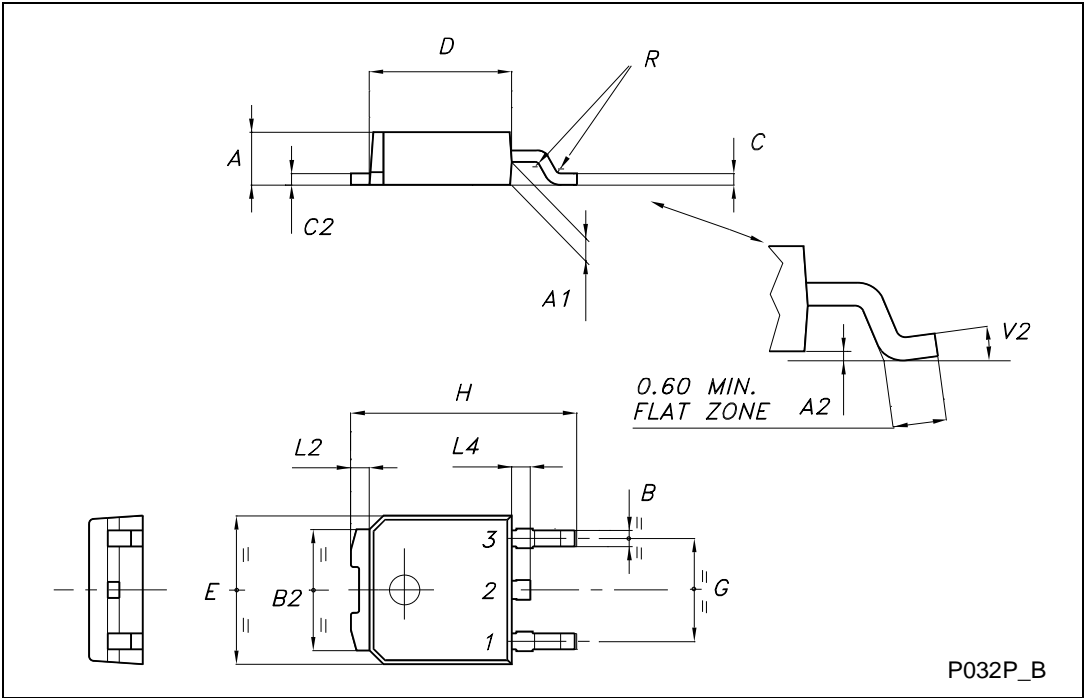


Fig. 1: Gate Charge test Circuit**Fig. 2: Test Circuit For Inductive Load Switching**

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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