



STGW40NC60V

N-CHANNEL 50A - 600V TO-247

Hyper Fast PowerMESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)} (Max)@25°C	I _C @100°C
STGW40NC60V	600 V	< 2.5 V	50 A

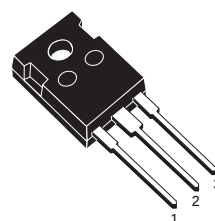
- HIGH INPUT IMPEDANCE
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- VERY HIGH FREQUENCY OPERATION
- CO-PACKAGED WITH TURBOSWITCH ANTIPARALLEL DIODE

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 "V" identifies a family optimized for high frequency welding and SMPS applications.

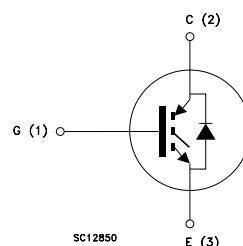
APPLICATIONS

- HIGH FREQUENCY INVERTERS
- SMPS and PFC IN BOTH HARD SWITCH AND RESONANT TOPOLOGIES
- UPS
- WELDING



TO-247

INTERNAL SCHEMATIC DIAGRAM



ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STGW40NC60V	GW40NC60V	TO-247	TUBE

STGW40NC60V

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 $T_C = 25^\circ\text{C}$	80	A
I_C	Collector Current (continuous) at $T_C = 100^\circ\text{C}$	50	A
$I_{CM}(\bullet)$	Collector Current (pulsed)	220	A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	260	W
	Derating Factor	2.6	W/ $^\circ\text{C}$
T_{stg}	Storage Temperature	- 55 to 125	$^\circ\text{C}$
T_j	Max. Operating Junction Temperature	125	$^\circ\text{C}$

($\bullet$)Pulse width limited by safe operating area

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.385	$^\circ\text{C}/\text{W}$
Rthj-amb	Thermal Resistance Junction-ambient Max	30	$^\circ\text{C}/\text{W}$

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	$I_C = 1\text{ mA}$, $V_{GE} = 0$	600			V
I_{CES}	Collector cut-off ($V_{GE} = 0$)	$V_{CE} = \text{Max Rating}$, $T_C = 25^\circ\text{C}$ $V_{CE} = \text{Max Rating}$, $T_C = 125^\circ\text{C}$			250 1000	μA μA
I_{GES}	Gate-Emitter Leakage Current ($V_{CE} = 0$)	$V_{GE} = \pm 20\text{ V}$, $V_{CE} = 0$			± 250	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE} = V_{GE}$, $I_C = 250\text{ }\mu\text{A}$	3	4	5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE} = 15\text{ V}$, $I_C = 40\text{ A}$, $T_j = 25^\circ\text{C}$ $V_{GE} = 15\text{ V}$, $I_C = 40\text{ A}$, $T_j = 125^\circ\text{C}$		1.92 1.7	2.5	V V

ELECTRICAL CHARACTERISTICS (CONTINUED)

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	$V_{CE} = 25\text{ V}$, $I_C = 20\text{ A}$		20		S
C_{ies}	Input Capacitance	$V_{CE} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GE} = 0$		4550		pF
C_{oes}	Output Capacitance			350		pF
C_{res}	Reverse Transfer Capacitance			105		pF
Q_g Q_{ge} Q_{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	$V_{CE} = 480\text{ V}$, $I_C = 40\text{ A}$, $V_{GE} = 15\text{ V}$		220 30 105		nC nC nC
I_{CL}	Latching Current	$V_{clamp} = 480\text{ V}$, $T_J = 125^\circ\text{C}$ $R_G = 10\ \Omega$	220			A

SWITCHING ON

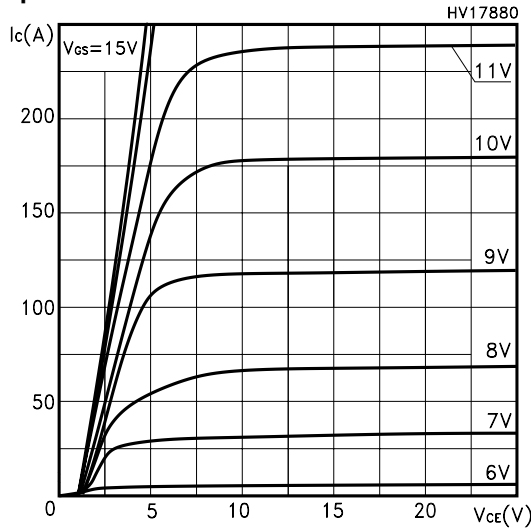
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{CC} = 480\text{ V}$, $I_C = 40\text{ A}$ $R_G = 10\ \Omega$, $V_{GE} = 15\text{ V}$		45 27		ns ns
$(di/dt)_{on}$ E_{on}	Turn-on Current Slope Turn-on Switching Losses	$V_{CC} = 480\text{ V}$, $I_C = 40\text{ A}$ $R_G = 10\ \Omega$, $V_{GE} = 15\text{ V}$, $T_J = 125^\circ\text{C}$		1150 800		A/ μs μJ

SWITCHING OFF

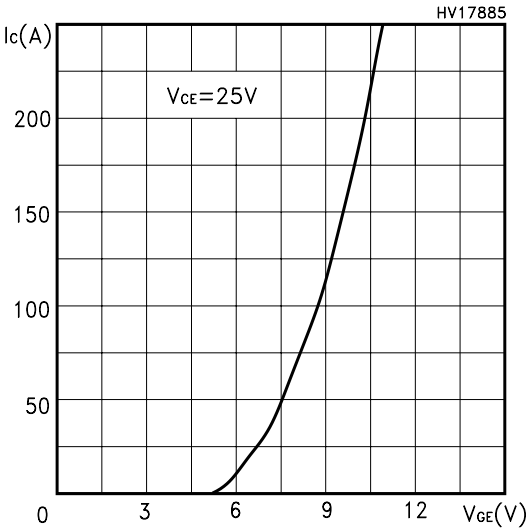
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_r(V_{off})$ $t_{d(off)}$ t_f $E_{off(**)}$ E_{ts}	Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss Total Switching Loss	$V_{CC} = 480\text{ V}$, $I_C = 40\text{ A}$, $R_{GE} = 10\ \Omega$, $V_{GE} = 15\text{ V}$ $T_J = 25^\circ\text{C}$		37 270 70 1120 1880		ns ns ns μJ μJ
$t_r(V_{off})$ $t_{d(off)}$ t_f $E_{off(**)}$ E_{ts}	Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss Total Switching Loss			67 325 120 1600 2400		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)

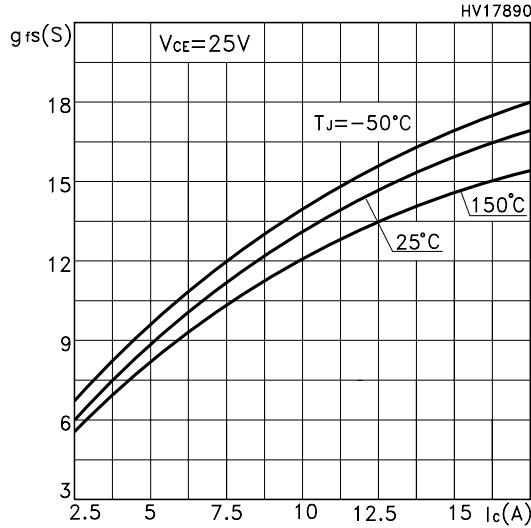
Output Characteristics



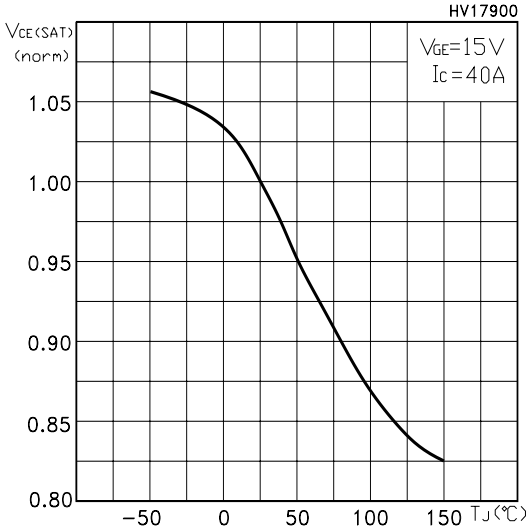
Transfer Characteristics



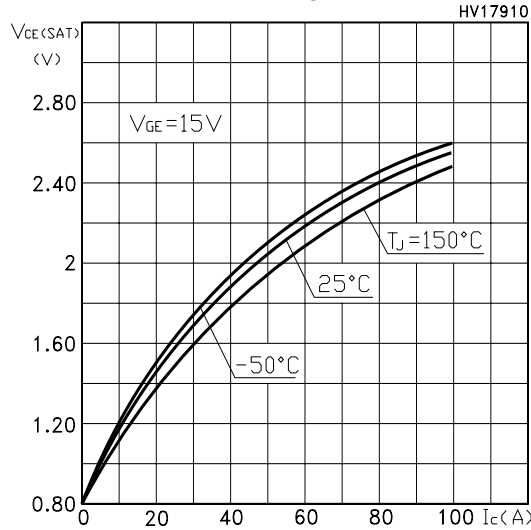
Transconductance



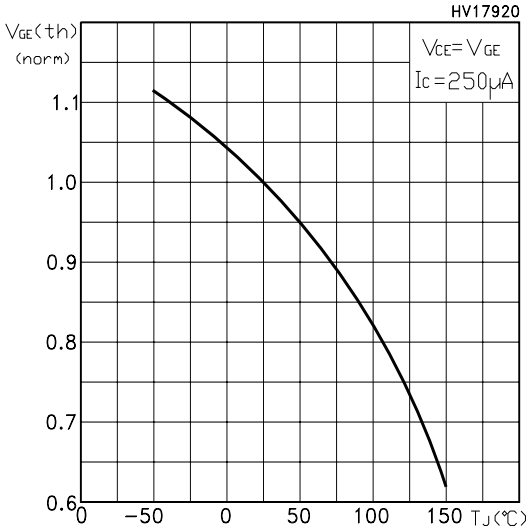
Normalized Collector-Emitter On Voltage vs Temp.



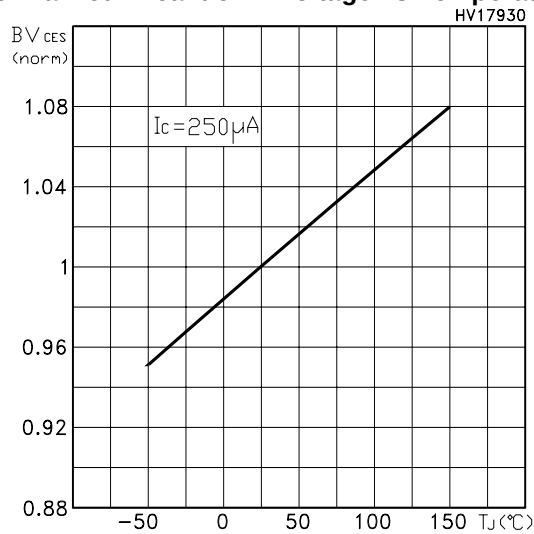
Collector-Emitter On Voltage vs Collector Current



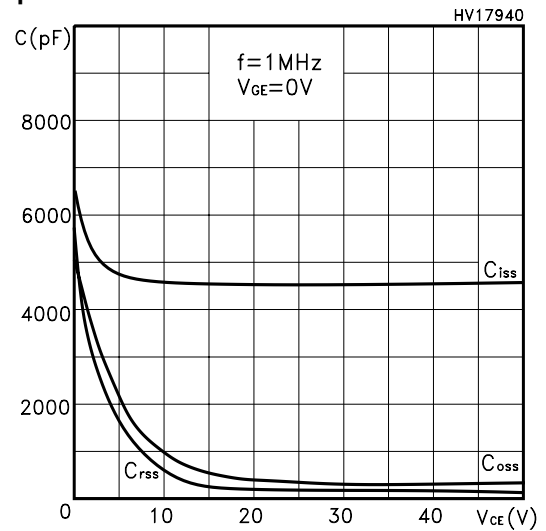
Gate Threshold vs Temperature



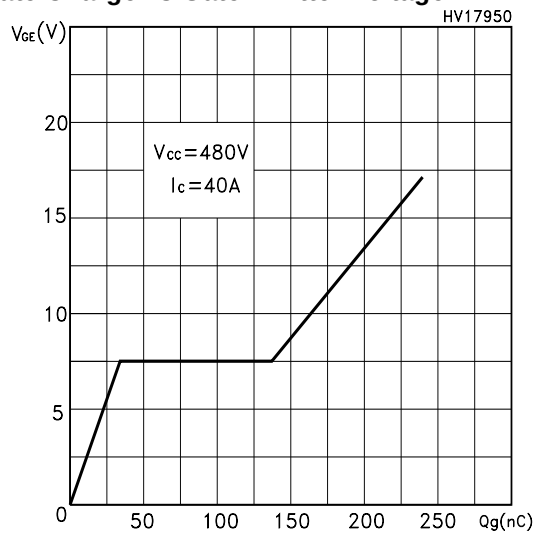
Normalized Breakdown Voltage vs Temperature



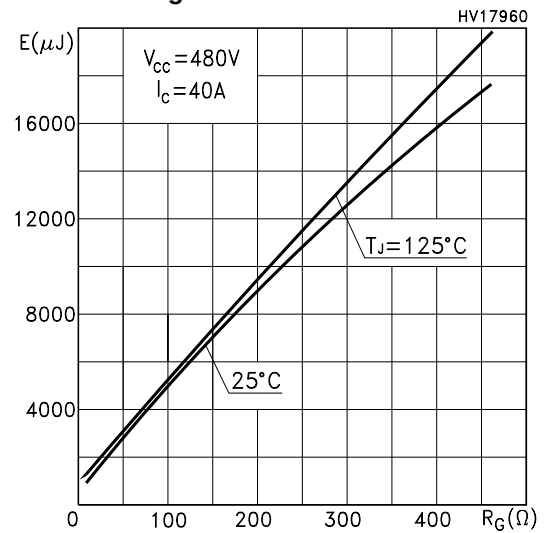
Capacitance Variations



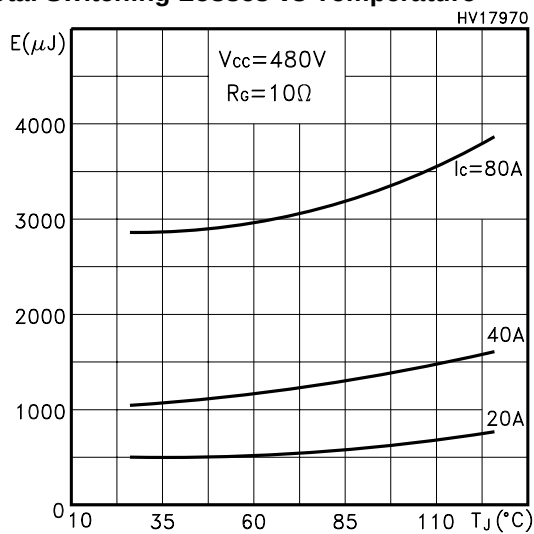
Gate Charge vs Gate-Emitter Voltage



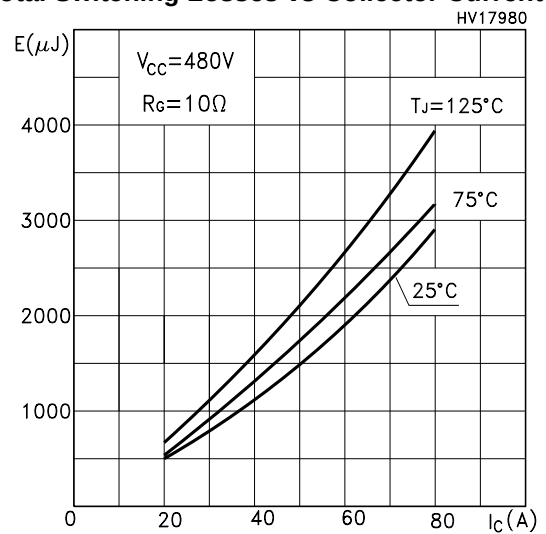
Total Switching Losses vs Gate Resistance



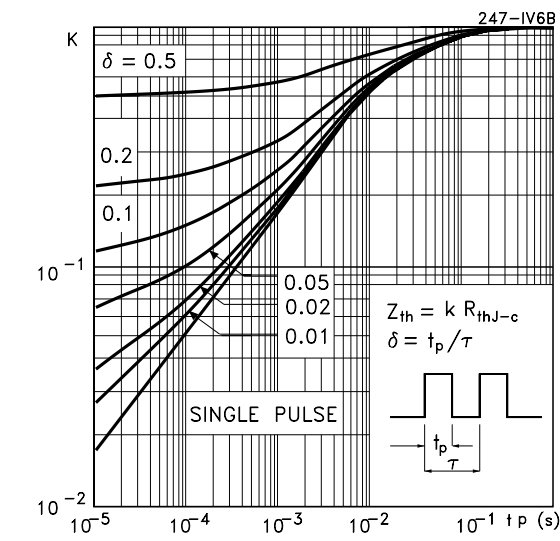
Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Thermal Impedance for Max247



Turn-Off SOA

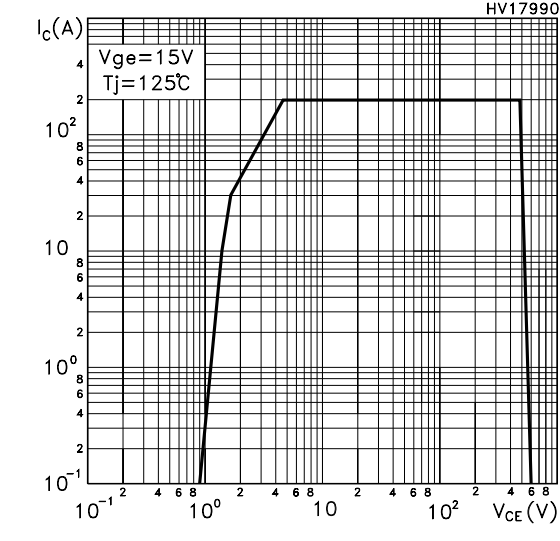
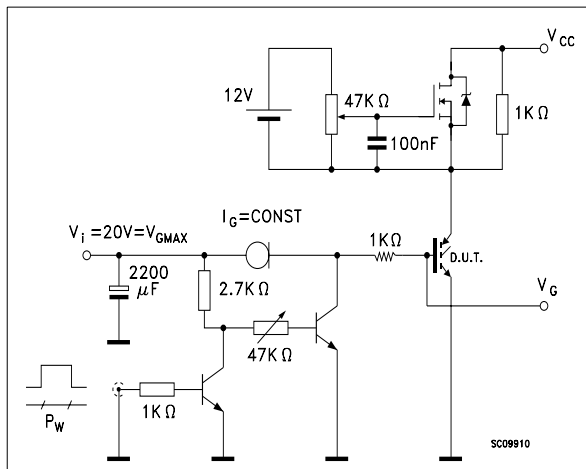
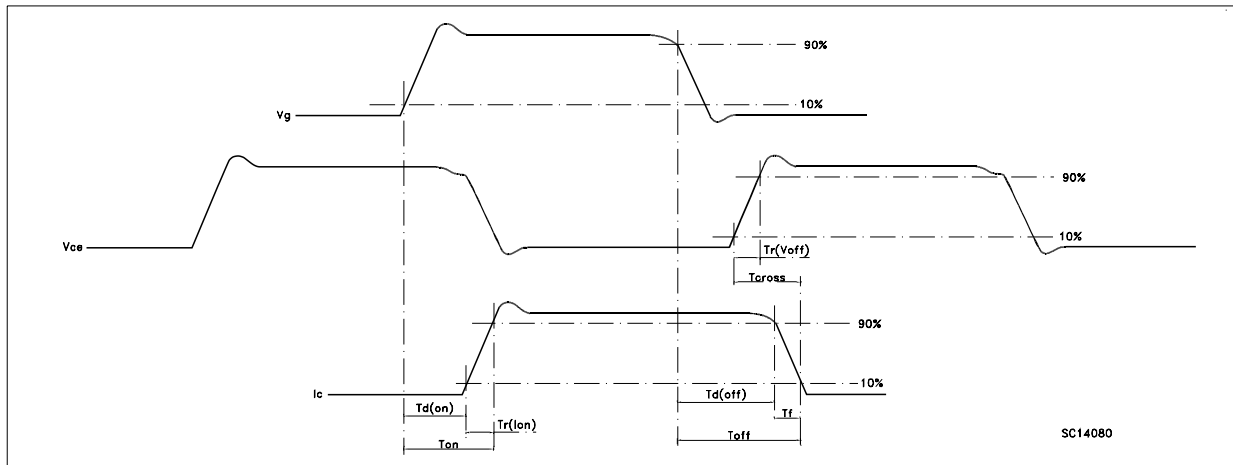
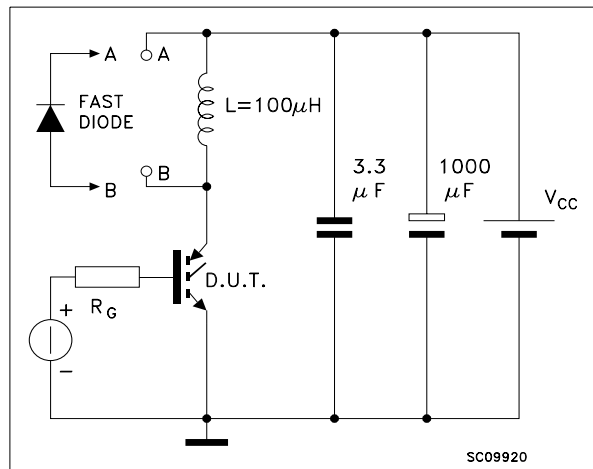
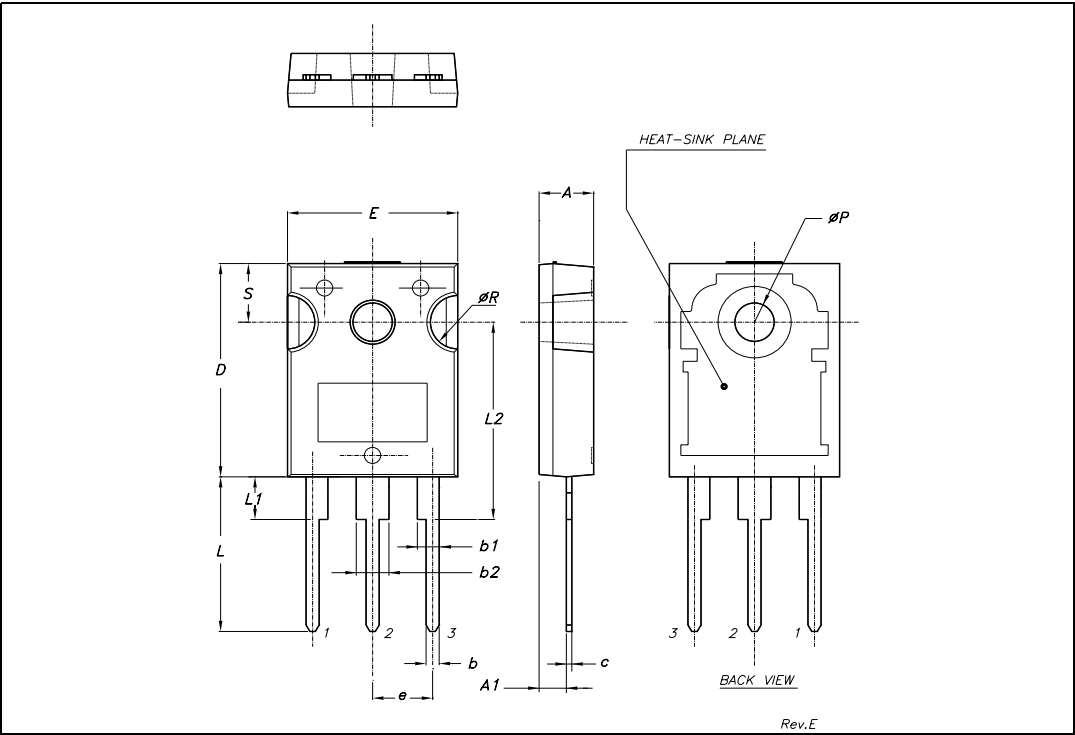


Fig. 1: Gate Charge test Circuit**Fig. 2: Test Circuit For Inductive Load Switching**

TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
A1	2.20		2.60	0.086		0.102
b	1.0		1.40	0.039		0.055
b1	2.0		2.40	0.079		0.094
b2	3.0		3.40	0.118		0.134
c	0.40		0.80	0.015		0.03
D	19.85		20.15	0.781		0.793
E	15.45		15.75	0.608		0.620
e		5.45			0.214	
L	14.20		14.80	0.560		0.582
L1	3.70		4.30	0.14		0.17
L2		18.50			0.728	
øP	3.55		3.65	0.140		0.143
øR	4.50		5.50	0.177		0.216
S		5.50			0.216	



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