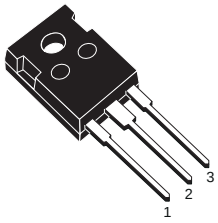
STGW40NC60V

N-CHANNEL 50A - 600V TO-247
Hyper Fast PowerMESH™ IGBT

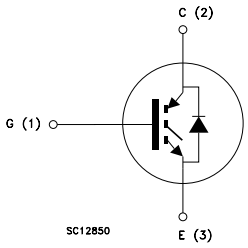
TYPE	V_{CES}	$V_{CE(sat)}$ (Max)@25°C	I_C @100°C
STGW40NC60V	600 V	< 2.5 V	50 A

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



TO-247

INTERNAL SCHEMATIC DIAGRAM



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

ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STGW40NC60V	GW40NC60V	TO-247	TUBE

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

(•)Pulse width limited by safe operating area

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.385	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	30	°C/W

ELECTRICAL CHARACTERISTICS (T_{CASE} = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{BR(CES)}$	Collector-Emitter Breakdown Voltage	I_C = 1 mA, V_{GE} = 0	600			V
I_{CES}	Collector cut-off (V_{GE} = 0)	V_{CE} = Max Rating, T_C = 25 °C			250	µA
		V_{CE} = Max Rating, T_C = 125 °C			1000	µA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ±20 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 µA	3	4	5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15 V, I_C = 40 A, Tj =25°C		1.92	2.5	V
		V_{GE} =15 V, I_C = 40 A, Tj =125°C		1.7		V

ELECTRICAL CHARACTERISTICS (CONTINUED)

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 25 V , I_C = 20 A		20		S
C_{ies}	Input Capacitance	V_{CE} = 25 V, f= 1 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 V, I_C = 40 A, V_{GE} = 15 V		220 30 105		nC nC nC
I_{CL}	Latching Current	V_{clamp} = 480 V , Tj = 125°C R_G = 10 Ω	220			A

SWITCHING ON

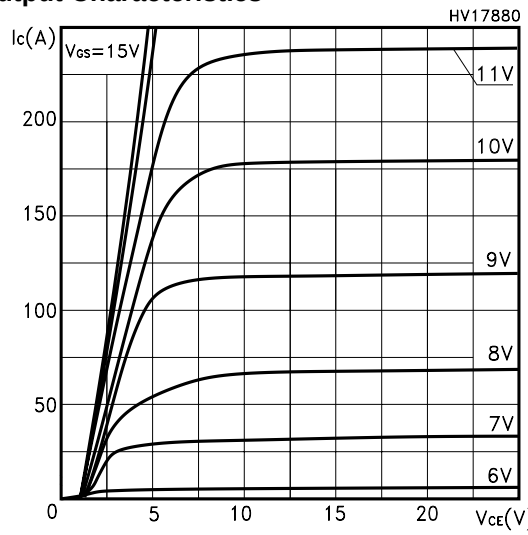
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	V_{CC} = 480 V, I_C = 40 A R_G = 10Ω , V_{GE} = 15 V		45 27		ns ns
$(di/dt)_{on}$ Eon	Turn-on Current Slope Turn-on Switching Losses	V_{CC}= 480 V, I_C = 40 A R_G= 10 Ω, V_{GE} = 15 V, Tj =125°C		1150 800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

SWITCHING OFF

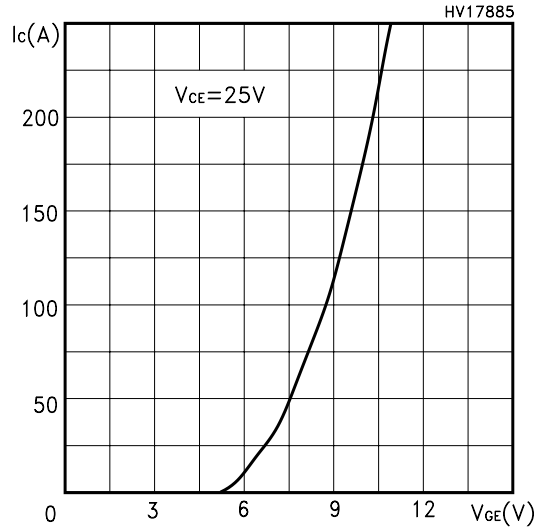
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_r(V_{off})$	Off Voltage Rise Time	V_{cc} = 480 V, I_C = 40 A, R_{GE} = 10 Ω , V_{GE} = 15 V T_J = 25 °C		37		ns
$t_{d(off)}$	Delay Time			270		ns
t_f	Fall Time			70		ns
E_{off}(**)	Turn-off Switching Loss			1120		µJ
E_{ts}	Total Switching Loss			1880		µJ
$t_r(V_{off})$	Off Voltage Rise Time	V_{cc} = 480 V, I_C = 40 A, R_{GE} = 10 Ω , V_{GE} = 15 V Tj = 125 °C		67		ns
$t_{d(off)}$	Delay Time			325		ns
t_f	Fall Time			120		ns
E_{off}(**)	Turn-off Switching Loss			1600		µJ
E_{ts}	Total Switching Loss			2400		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)

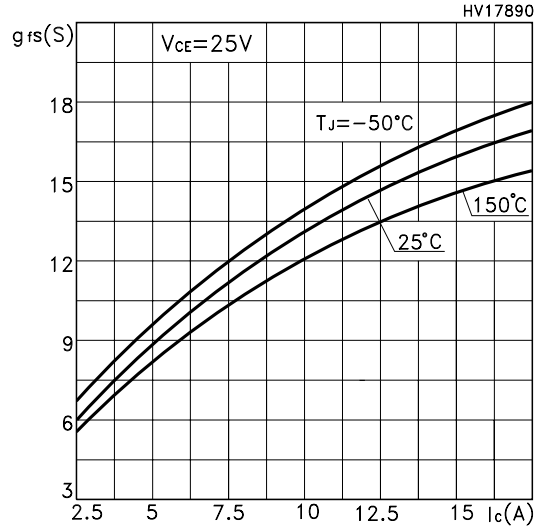
Output Characteristics



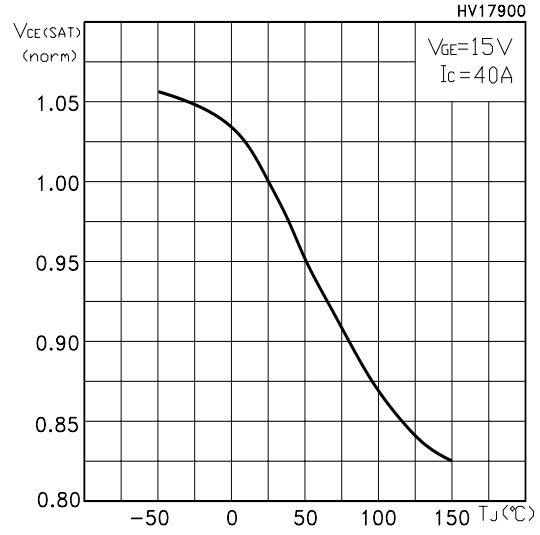
Transfer Characteristics



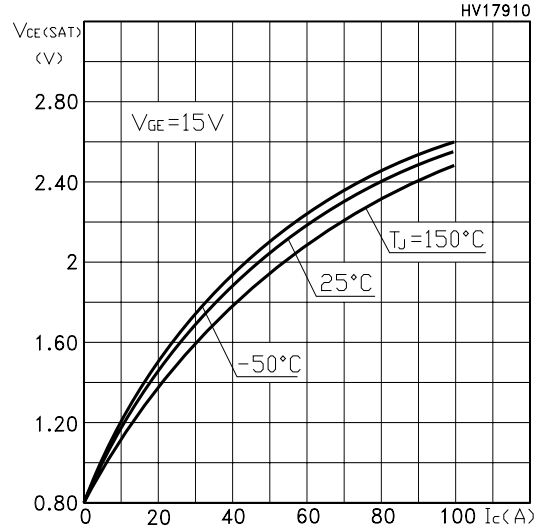
Transconductance



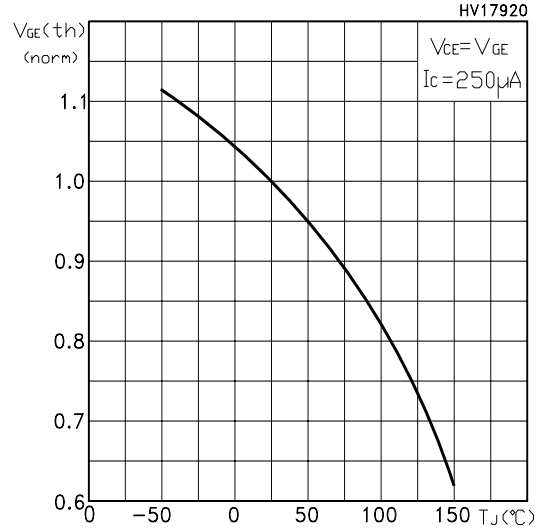
Normalized Collector-Emitter On Voltage vs Temp.



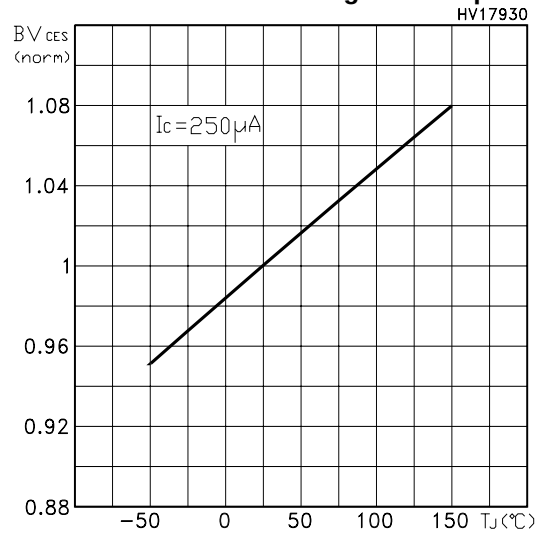
Collector-Emitter On Voltage vs Collector Current



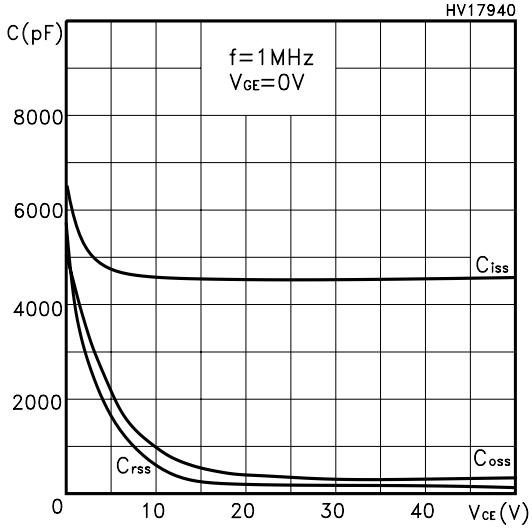
Gate Threshold vs Temperature



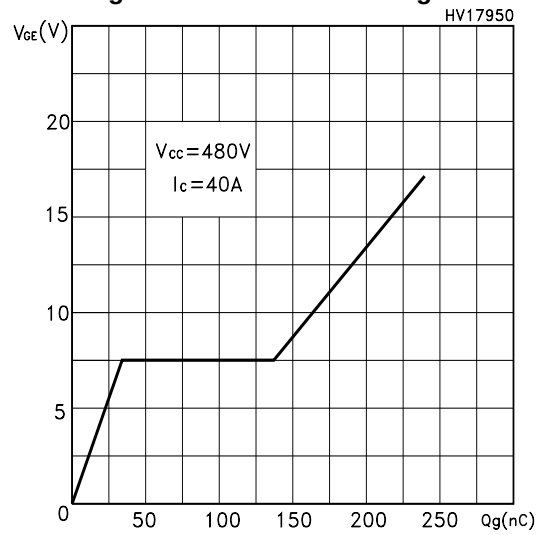
Normalized Breakdown Voltage vs Temperature



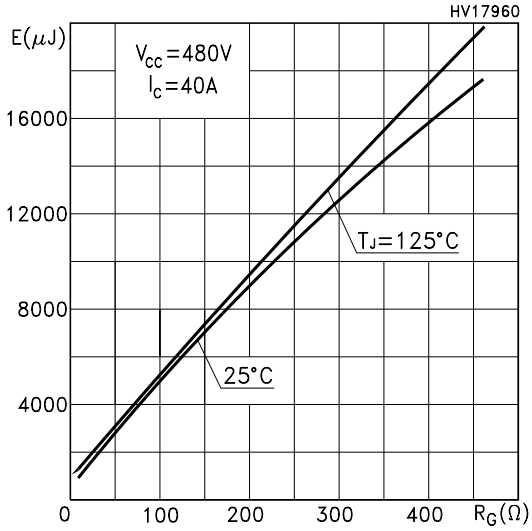
Capacitance Variations



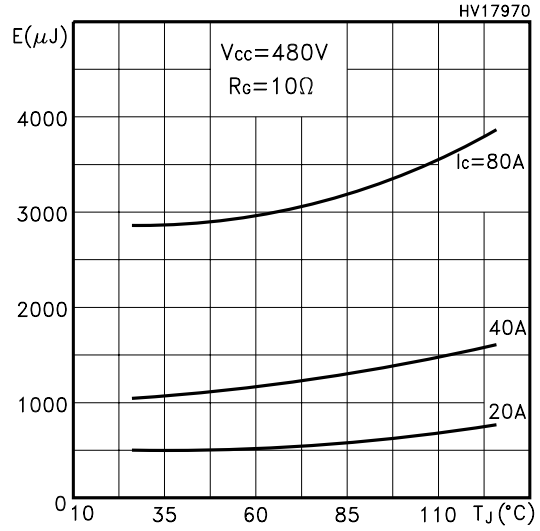
Gate Charge vs Gate-Emitter Voltage



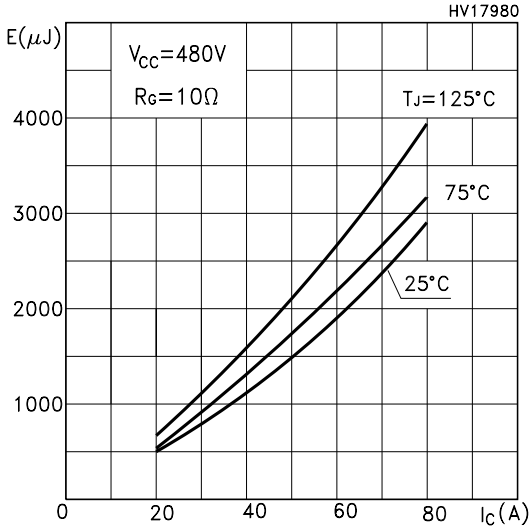
Total Switching Losses vs Gate Resistance



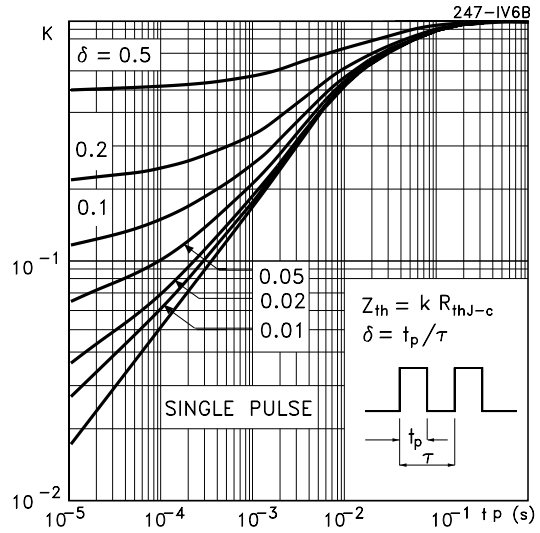
Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Thermal Impedance for Max247



Turn-Off SOA

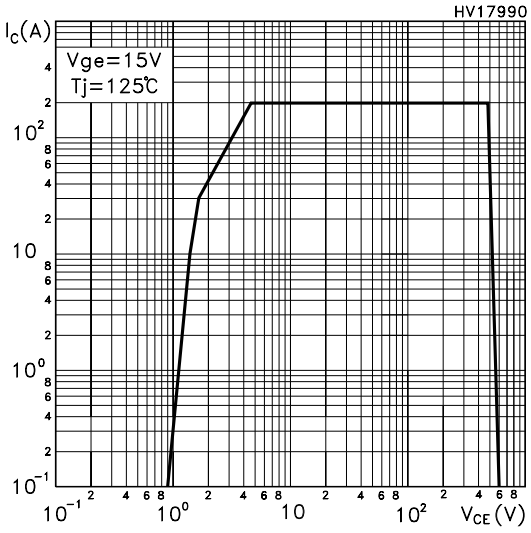


Fig. 1: Gate Charge test Circuit

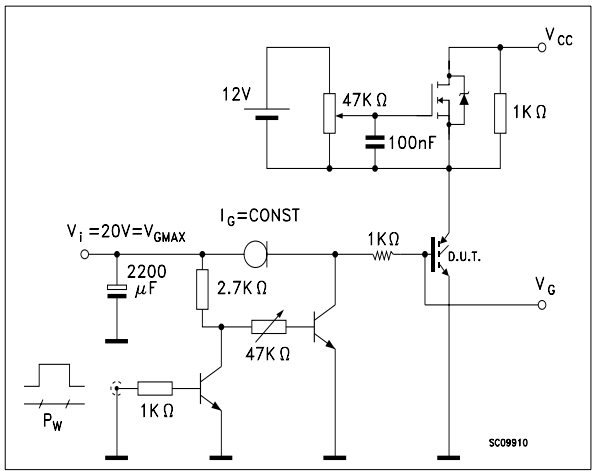
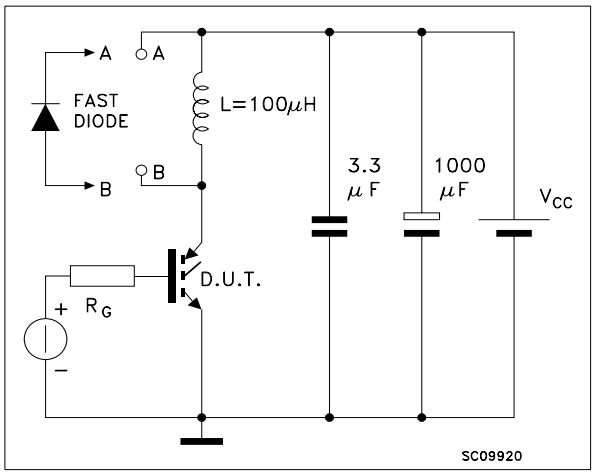
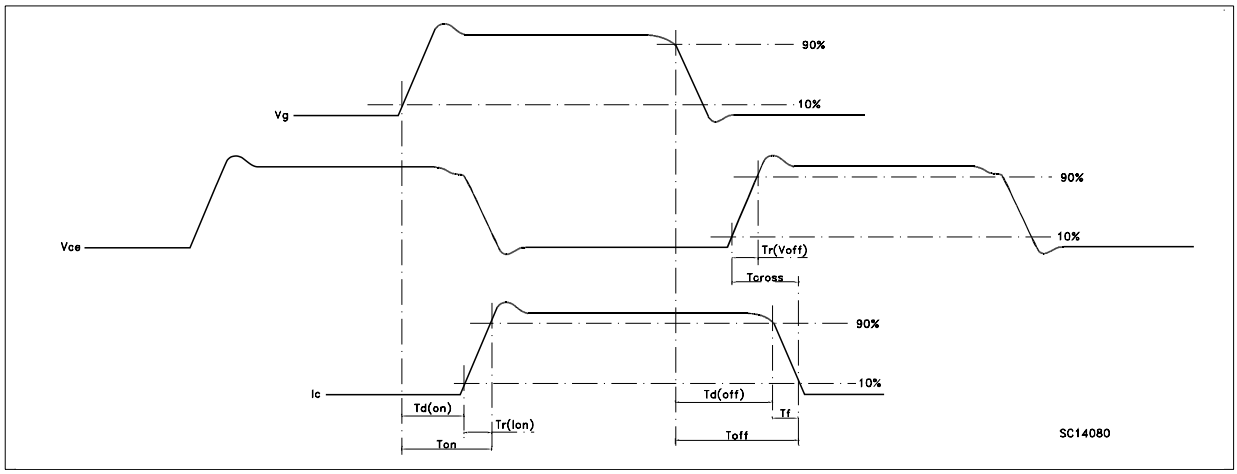


Fig. 2: Test Circuit For Inductive Load Switching





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