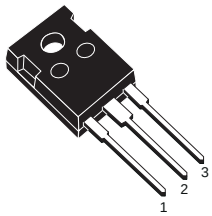
STGW50NB60M

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

TYPE	V_{CES}	$V_{CE(sat)(25°C)}$	I_C
STGW50NB60M	600 V	< 1.9 V	50 A

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{CESAT})
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY

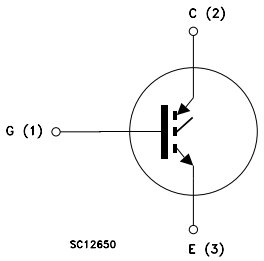


TO-247

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 saturation on voltage for frequency applications <10 KHz.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- MOTOR CONTROL
- WELDING EQUIPMENTS

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	600	V
V_{ECR}	Reverse Battery Protection	20	V
V_{GE}	Gate-Emitter Voltage	±20	V
I_C	Collector Current (continuous) at T_C = 25°C	100	A
I_C	Collector Current (continuous) at T_C = 100°C	50	A
I_{CM} (●)	Collector Current (pulsed)	400	A
P_{TOT}	Total Dissipation at T_C = 25°C	250	W
	Derating Factor	2	W/°C
T_{stg}	Storage Temperature	–65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(●) Pulse width limited by safe operating area

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.5	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	30	°C/W
Rthc-h	Thermal Resistance Case-heatsink Typ	0.1	°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 = 250 µA, 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	µA µA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ± 20 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 µA	3	4	5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15V, I_C = 30 A @25°C V_{GE} = 15V, I_C = 30 A @100°C V_{GE} = 15V, I_C = 50 A @25°C V_{GE} = 15V, I_C = 50 A @100°C		1.3 1.2 1.5 1.35	 1.9	V V V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 15 V , I_C = 18 A		22		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25 V, f = 1 MHz, V_{GE} = 0		4500 400 70		pF pF pF
Q_g Q_{ge} Q_{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V_{CE} = 480 V, I_C = 50 A, V_{GE} = 15 V		231 28 97		nC nC nC
I_{CL}	Latching Current	V_{clamp} = 480 V , Tj = 125°C R_G = 10 Ω	300			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 = 50 A R_G = 10Ω , V_{GE} = 15 V		45 30		ns ns
$(di/dt)_{on}$ Eon	Turn-on Current Slope Turn-on Switching Losses	V_{CC}= 480 V, I_C = 50 A R_G=10 Ω , V_{GE} = 15 V Tj = 125°C		1600 800		A/µs µJ

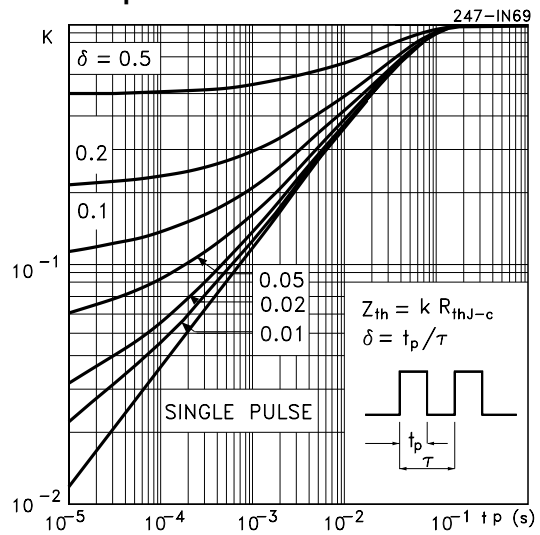
ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING OFF

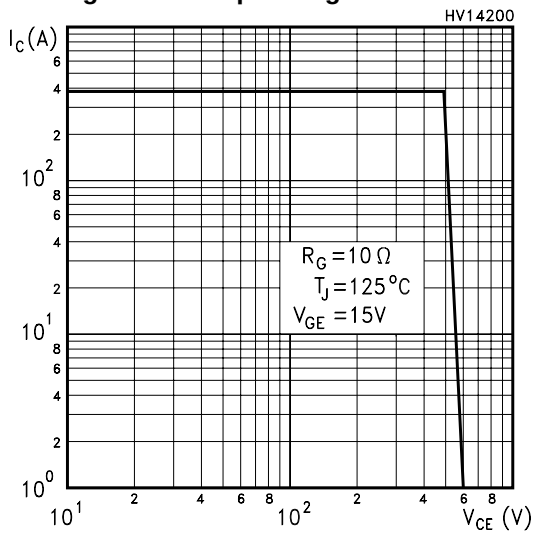
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	V_{cc} = 480 V, I_C = 50 A		450		ns
$t_r(V_{off})$	Off Voltage Rise Time	R_{GE} = 10 Ω , V_{GE} = 15 V		130		ns
$t_{d(off)}$	Delay Time			410		ns
t_f	Fall Time			300		ns
E_{off}(**)	Turn-off Switching Loss			4		mJ
E_{ts}	Total Switching Loss			4.1		mJ
t_c	Cross-over Time	V_{cc} = 480 V, I_C = 50 A		730		ns
$t_r(V_{off})$	Off Voltage Rise Time	R_{GE} = 10 Ω , V_{GE} = 15 V		265		ns
$t_{d(off)}$	Delay Time	Tj = 125 °C		565		ns
t_f	Fall Time			440		ns
E_{off}(**)	Turn-off Switching Loss			6.6		mJ
E_{ts}	Total Switching Loss			7.1		mJ

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)

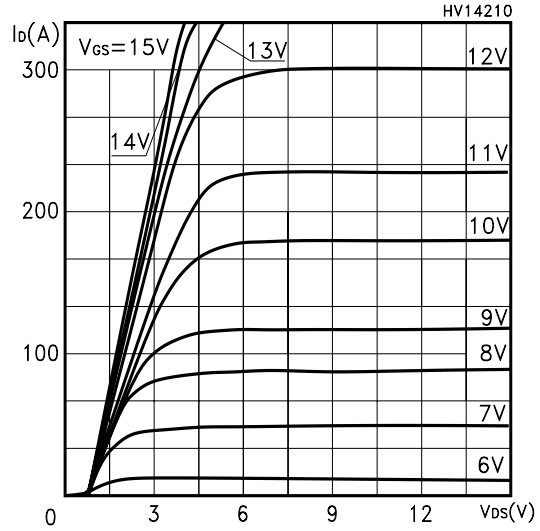
Thermal Impedance



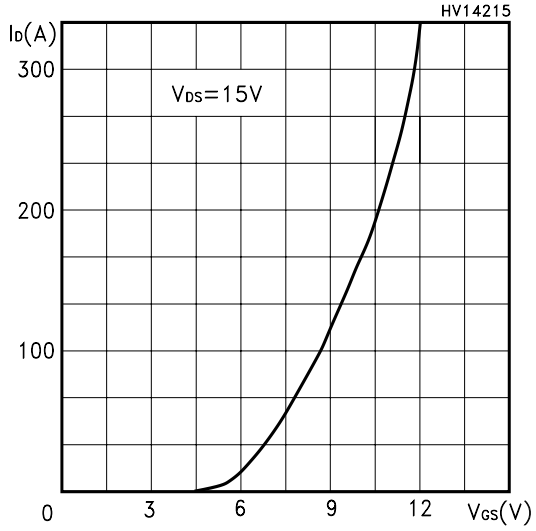
Switching Off Safe Operating Area



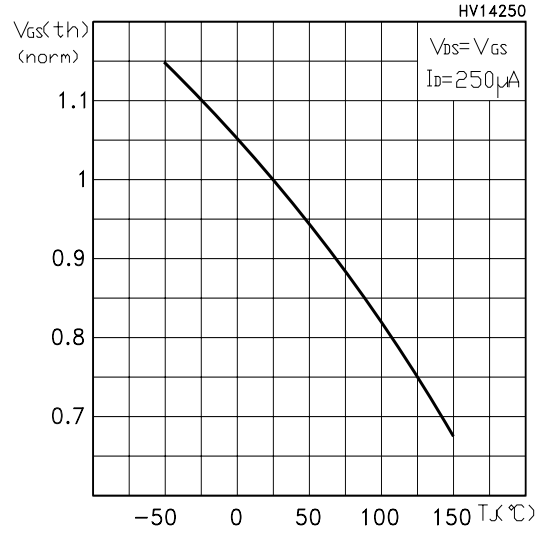
Output Characteristics



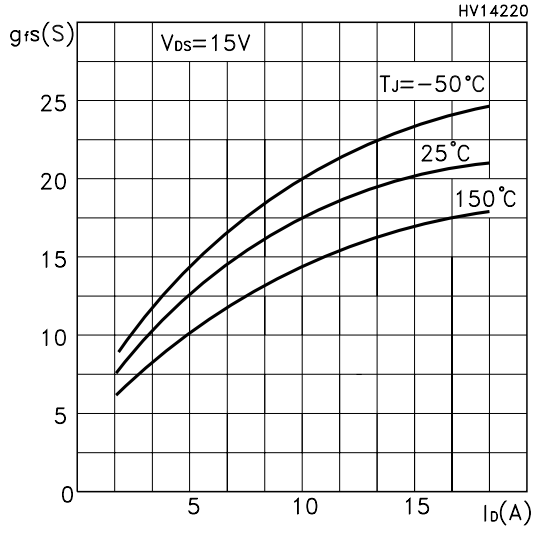
Transfer Characteristics



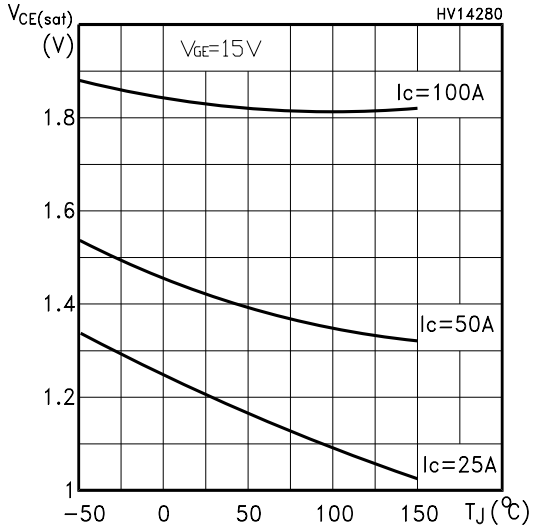
Normalized Gate Threshold Voltage vs Temp.



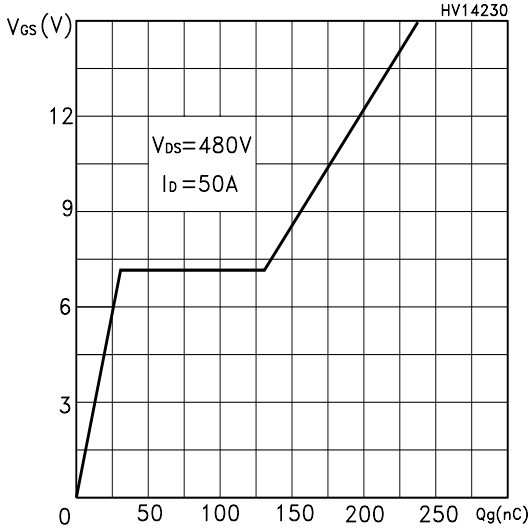
Transconductance



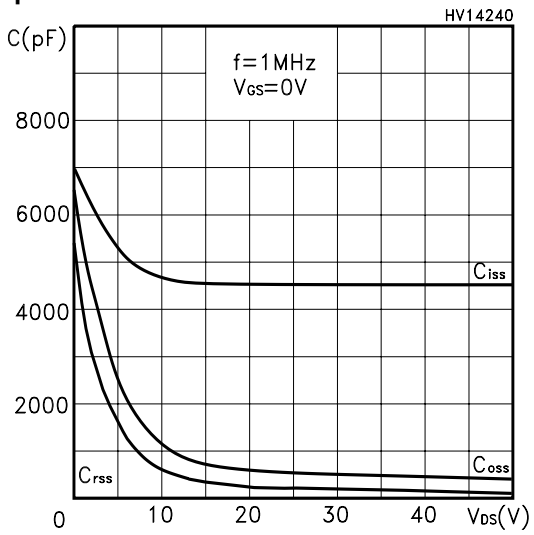
Collector-Emitter On Voltage vs Temperature



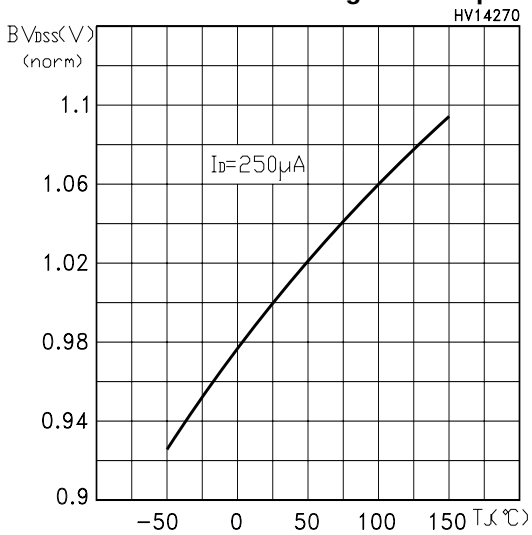
Gate-Charge vs Gate-Emitter Voltage



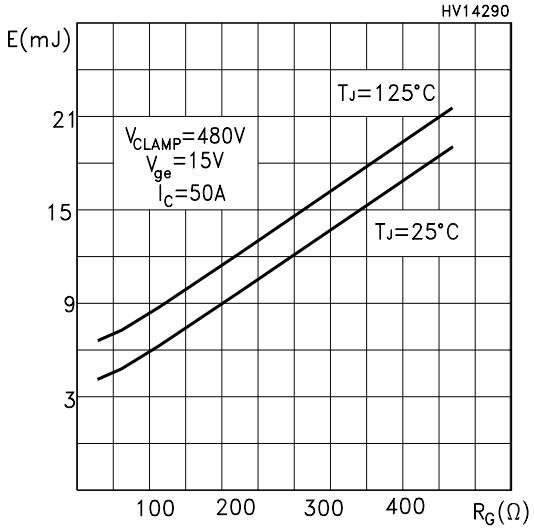
Capacitance Variations



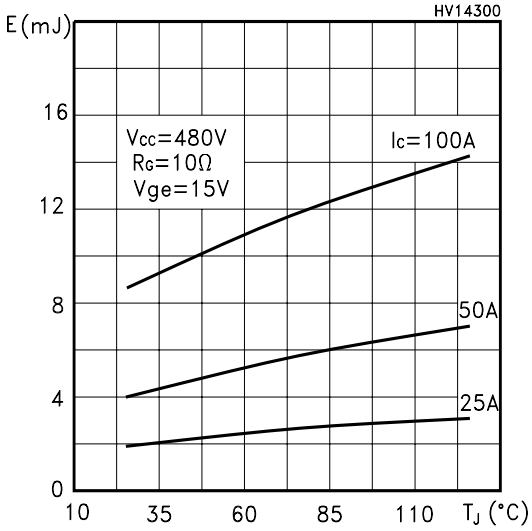
Normalized Break-down Voltage vs Temp.



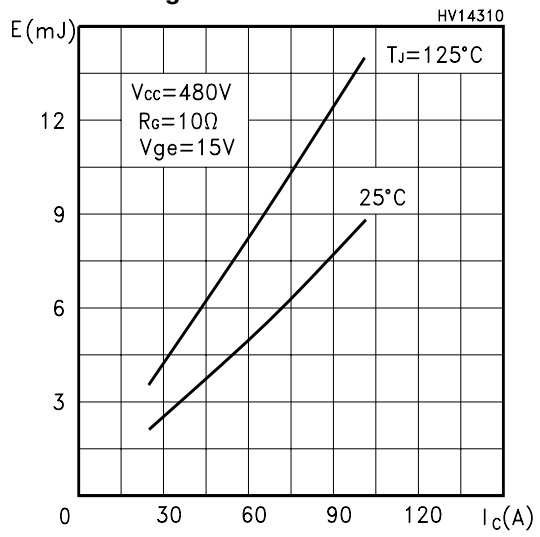
Total Switching losses vs Gate Resistance



Total Switching losses vs Temperature



Total Switching losses vs Ic



Collector-Emitter on Voltage vs Current

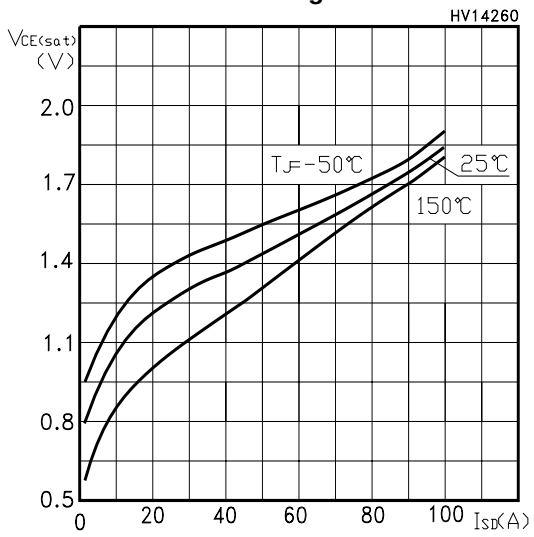


Fig. 1: Gate Charge test Circuit

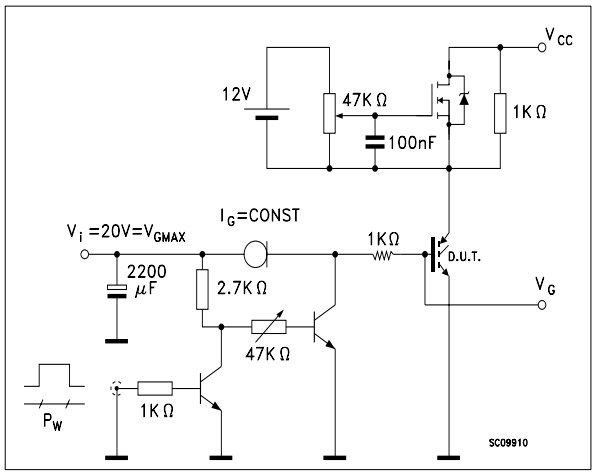
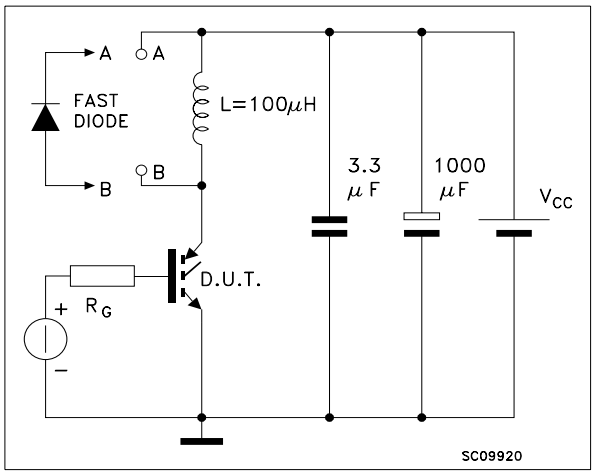
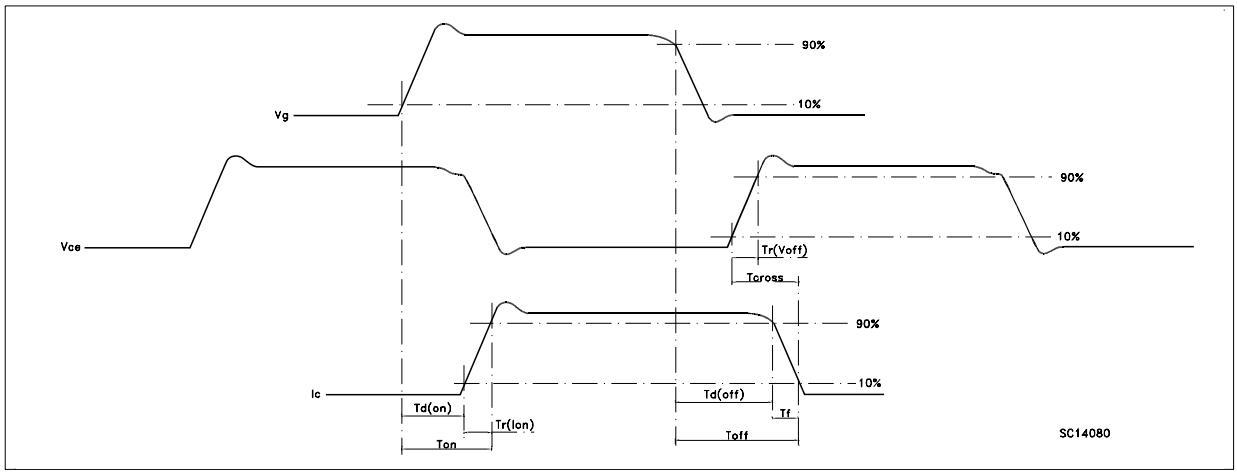


Fig. 2: Test Circuit For Inductive Load Switching





TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		5.15	0.19		0.20
D	2.20		2.60	0.08		0.10
E	0.40		0.80	0.015		0.03
F	1		1.40	0.04		0.05
F1		3			0.11	
F2		2			0.07	
F3	2		2.40	0.07		0.09
F4	3		3.40	0.11		0.13
G		10.90			0.43	
H	15.45		15.75	0.60		0.62
L	19.85		20.15	0.78		0.79
L1	3.70		4.30	0.14		0.17
L2		18.50			0.72	
L3	14.20		14.80	0.56		0.58
L4		34.60			1.36	
L5		5.50			0.21	
M	2		3	0.07		0.11
V		5º			5º	
V2		60º			60º	
Dia	3.55		3.65	0.14		0.143