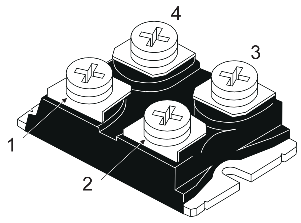
STGE200NB60S

N-CHANNEL 150A - 600V - ISOTOP
PowerMESH™ IGBT

TYPE	V_{CES}	$V_{CE(sat)}$ (typ.)	I_C	T_C
STGE200NB60S	600 V	1.2 V	150 A	100°C
		1.3 V	200 A	25°C

- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{cesat})
- OFF LOSSES INCLUDE TAIL CURRENT
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY

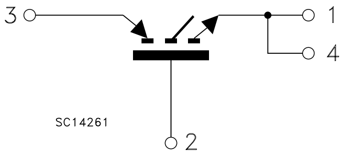


ISOTOP

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 “S” identifies a family optimized to achieve very low $V_{CE(sat)}$ (@ max frequency of 1KHz).

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- LOW FREQUENCY MOTOR CONTROLS
- ALUMINUM WELDING EQUIPMENT

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	600	V
V_{GE}	Gate-Emitter Voltage	±20	V
I_C	Collector Current (continuous) at T_C = 25°C	200	A
I_C	Collector Current (continuous) at T_C = 100°C	150	A
I_{CM} (■)	Collector Current (pulsed)	400	A
P_{TOT}	Total Dissipation at T_C = 25°C	600	W
	Derating Factor	4.8	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	0.208	°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 = 250 µA, V_{GE} = 0	600			V
I_{CES}	Collector cut-off (V_{GE} = 0)	V_{CE} = Max Rating, T_C = 25 °C			500	µA
		V_{CE} = Max Rating, T_C = 125 °C			5	mA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ±20V , 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 = 250µA	3		5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15V, I_C = 100 A		1.2	1.6	V
		V_{GE} = 15V, I_C=150 A, Tj =100°C		1.2		V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 15 V , I_C = 100 A		80		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25V, f = 1 MHz, V_{GE} = 0		15600 1100 95		pF pF pF
Q_g Q_{ge} Q_{gc}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V_{CE} = 480V, I_C = 100 A, V_{GE} = 15V		560 70 170		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 = 100 A R_G = 2Ω , V_{GE} = 15 V		64 112		µs µs
$(di/dt)_{on}$ Eon	Turn-on Current Slope Turn-on Switching Losses	V_{CC}= 480 V, I_C = 100 A R_G=2Ω V_{GE} = 15 V,Tj = 125°C		1800 12		A/µs mJ

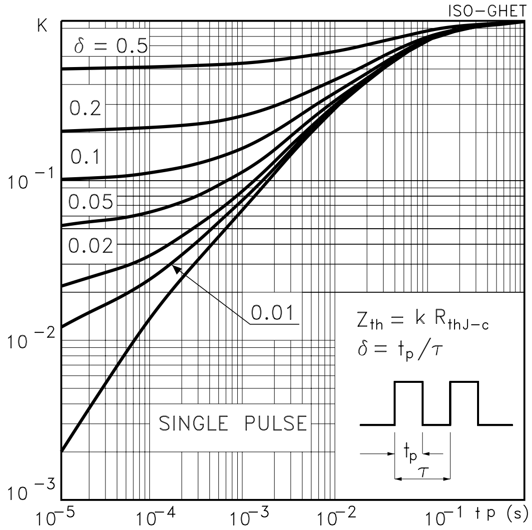
ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING OFF

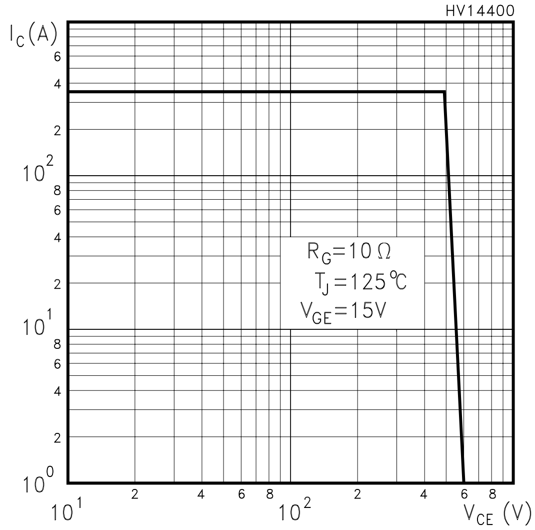
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	V_{cc} = 480 V, I_C = 100 A, R_{GE} = 2 Ω , V_{GE} = 15 V		2.98		µs
$t_r(V_{off})$	Off Voltage Rise Time			1.7		µs
$t_d(_{off})$	Delay Time			2.4		µs
t_f	Fall Time			1.23		µs
E_{off}(**)	Turn-off Switching Loss			59		mJ
E_{ts}	Total Switching Loss			71		mJ
t_c	Cross-over Time	V_{cc} = 480 V, I_C = 100 A, R_{GE} = 2 Ω , V_{GE} = 15 V Tj = 125 °C		4.52		µs
$t_r(V_{off})$	Off Voltage Rise Time			2.6		µs
$t_d(_{off})$	Delay Time			2.8		µs
t_f	Fall Time			1.8		µs
E_{off}(**)	Turn-off Switching Loss			92		mJ
E_{ts}	Total Switching Loss			105		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)

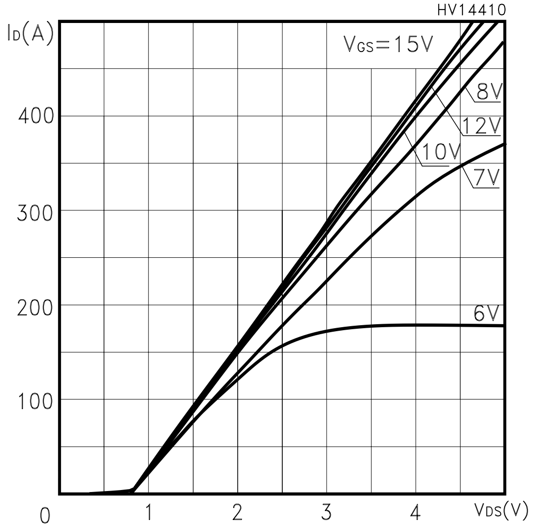
Thermal Impedance



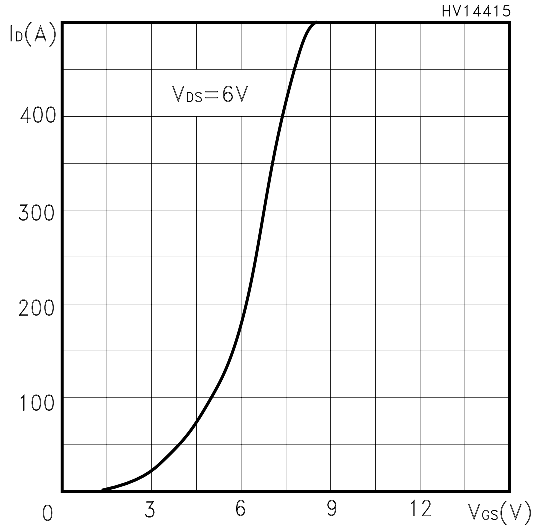
Switching Off Safe Operating Area



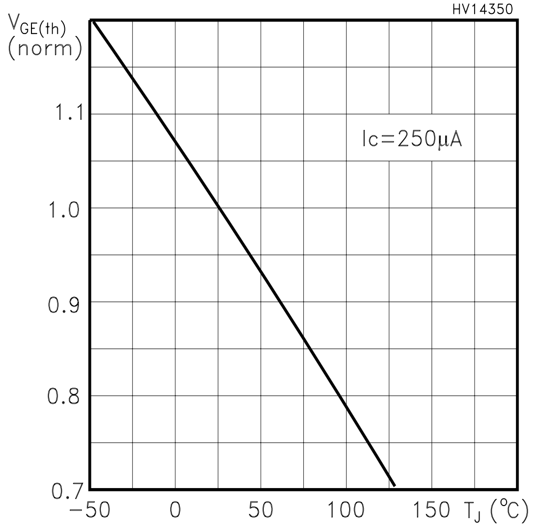
Output Characteristics



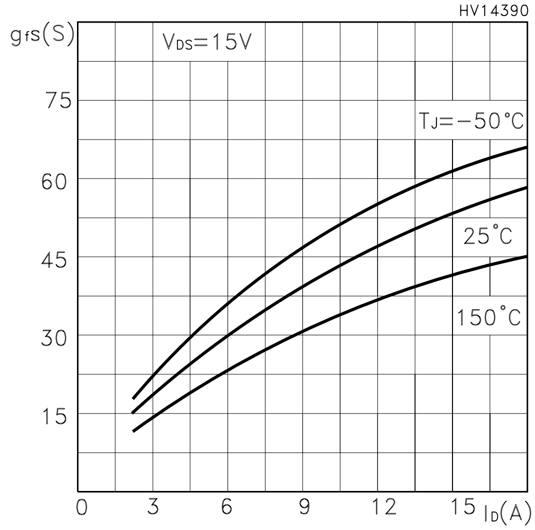
Transfer Characteristics



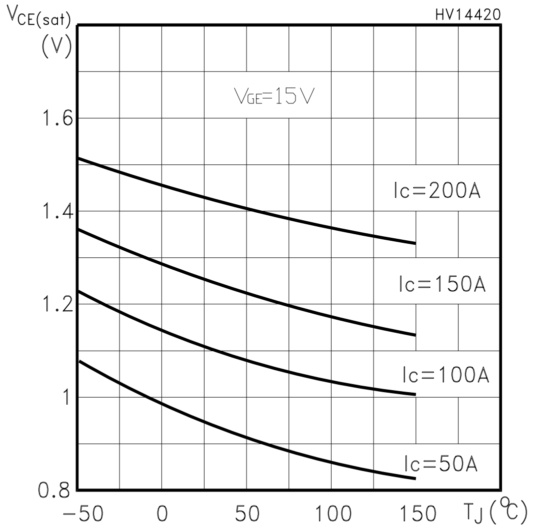
Normalized Gate Threshold Voltage vs Temp.



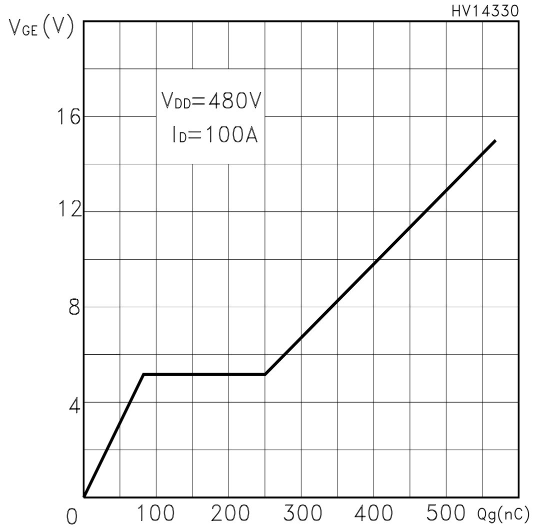
Transconductance



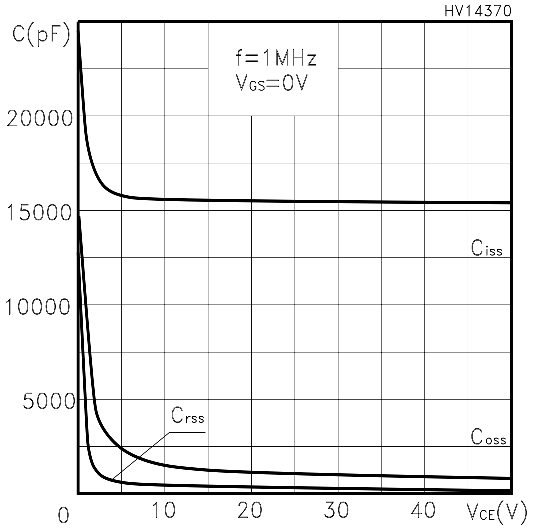
Collector-Emitter On Voltage vs Temperature



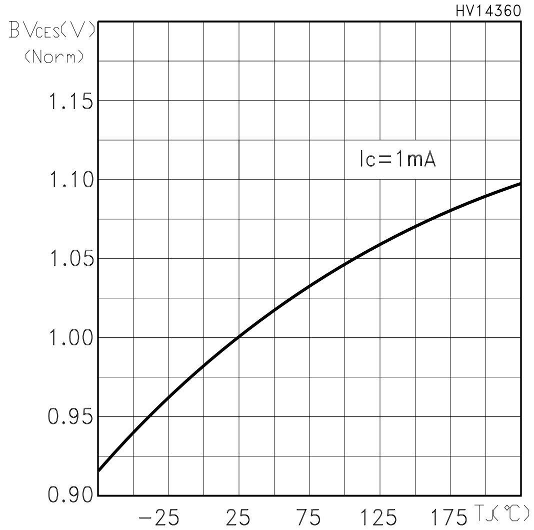
Gate-Charge vs Gate-Emitter Voltage



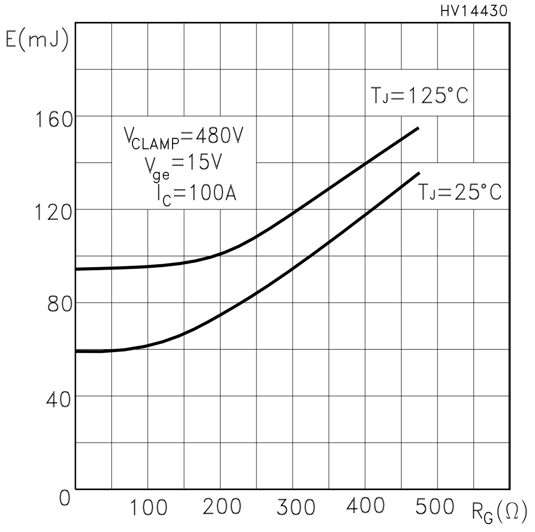
Capacitance Variations



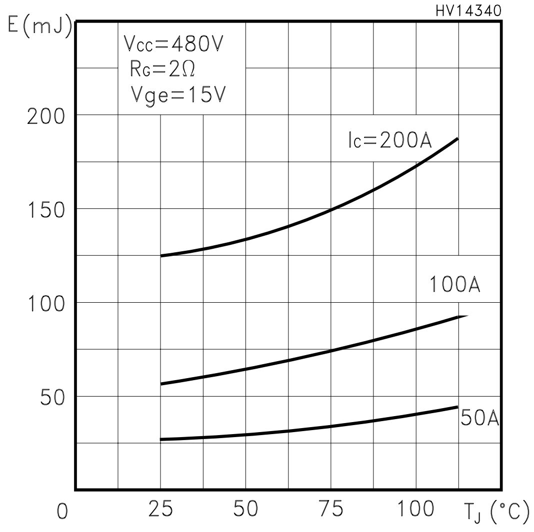
Normalized Break-down Voltage vs Temp.



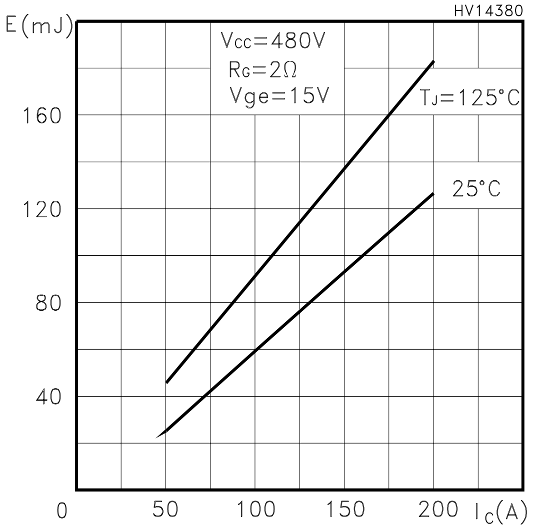
Total Switching losses vs Gate Resistance



Total Switching losses vs Temperature



Total Switching losses vs Ic



Collector-Emitter on Voltage vs Current

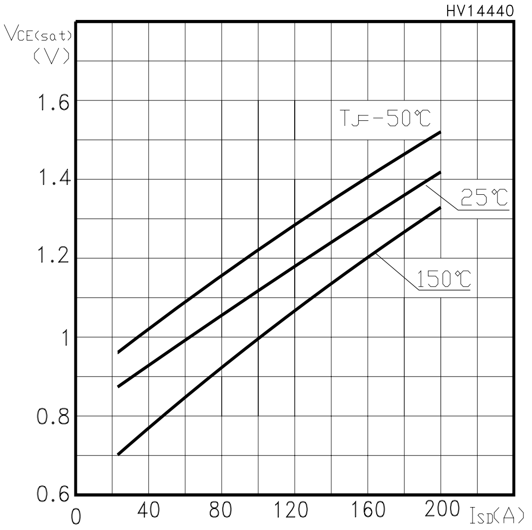


Fig. 1: Gate Charge test Circuit

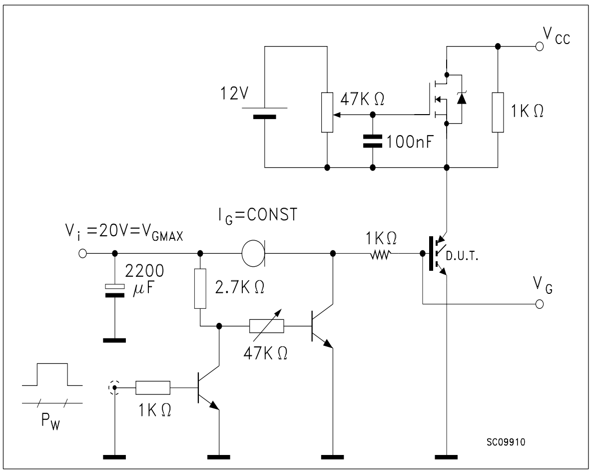
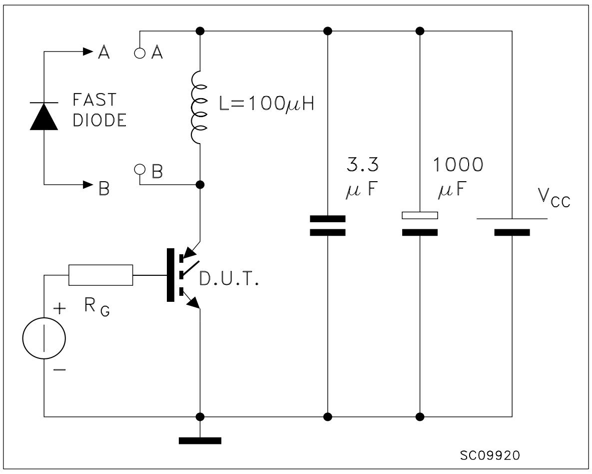
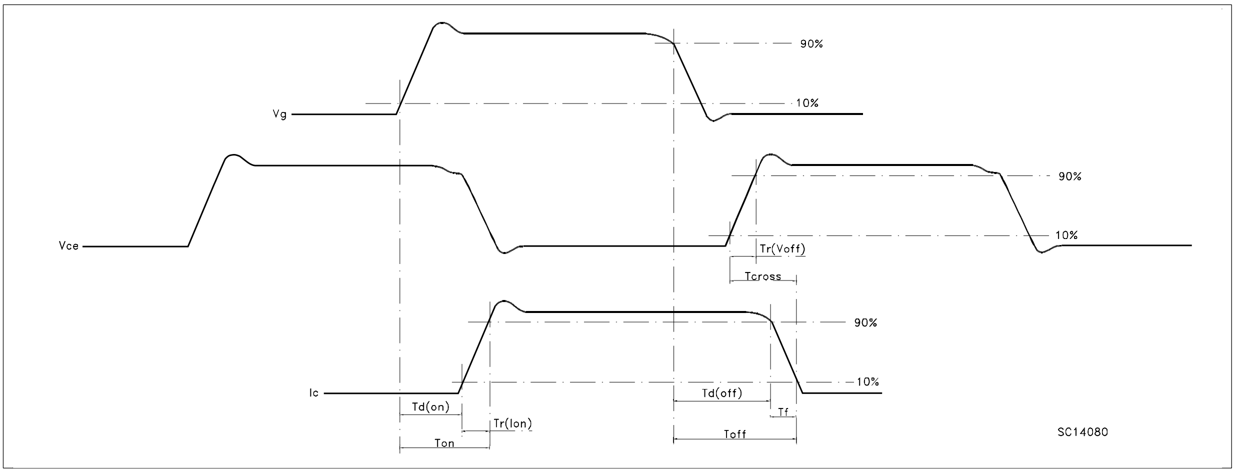


Fig. 2: Test Circuit For Inductive Load Switching





ISOTOP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.466		0.480
B	8.9		9.1	0.350		0.358
C	1.95		2.05	0.076		0.080
D	0.75		0.85	0.029		0.033
E	12.6		12.8	0.496		0.503
F	25.15		25.5	0.990		1.003
G	31.5		31.7	1.240		1.248
H	4			0.157		
J	4.1		4.3	0.161		0.169
K	14.9		15.1	0.586		0.594
L	30.1		30.3	1.185		1.193
M	37.8		38.2	1.488		1.503
N	4			0.157		
O	7.8		8.2	0.307		0.322