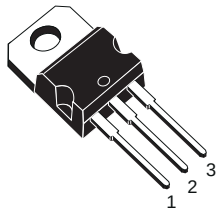
STGP7NB120SD

N-CHANNEL 7A - 1200V - TO-220
PowerMESH™ IGBT

TYPE	V_{CES}	$V_{CE(sat)}$	I_C
STGP7NB120SD	1200 V	< 2.1 V	7 A

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

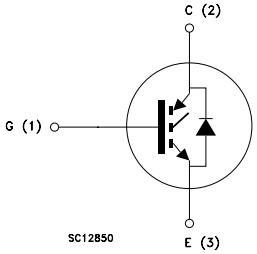


TO-220

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 achieve minimum on-voltage drop for low frequency applications (<1kHz).

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- MOTOR CONTROL
- LIGHT DIMMER
- INTRUSH CURRENT LIMITATION

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GS} = 0)	1200	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	10	A
I_C	Collector Current (continuous) at T_C = 100°C	7	A
I_{CM} (●)	Collector Current (pulsed)	20	A
P_{TOT}	Total Dissipation at T_C = 25°C	90	W
	Derating Factor	0.7	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	1.38	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°C/W
Rthc-h	Thermal Resistance Case-heatsink Typ	0.5	°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	1200			V
$V_{BR(ECR)}$	Emitter-Collector Breakdown Voltage	I_C = 10mA, V_{GE} = 0	20			V
I_{CES}	Collector cut-off (V_{GE} = 0)	V_{CE} = Max Rating, T_C = 25 °C			50	µA
		V_{CE} = Max Rating, T_C = 125 °C			250	µA
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 = 3.5 A			1.6	V
		V_{GE} = 15V, I_C = 7 A			2.1	V
		V_{GE} = 15V, I_C = 10 A		1.7		V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 25 V , I_C =7 A	2.5	4.5		S
C_{ies}	Input Capacitance	V_{CE} = 25V, f = 1 MHz, V_{GE} = 0		430		pF
C_{oes}	Output Capacitance			40		pF
C_{res}	Reverse Transfer Capacitance			7		pF
Q_g	Gate Charge	V_{CE} = 960V, I_C = 7 A, V_{GE} = 15V		29		nC
I_{CL}	Latching Current	V_{clamp} = 960V , Tj = 150°C R_G = 1KΩ	10			A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 960 V, I_C = 7 A		570		ns
t_r	Rise Time	R_G = 1KΩ , V_{GE} = 15 V		270		ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{CC}= 960 V, I_C = 7 A, R_G=1KΩ		800		A/µs
Eon	Turn-on Switching Losses	V_{GE} = 15 V, Tj = 125°C		3.2		mJ

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING OFF

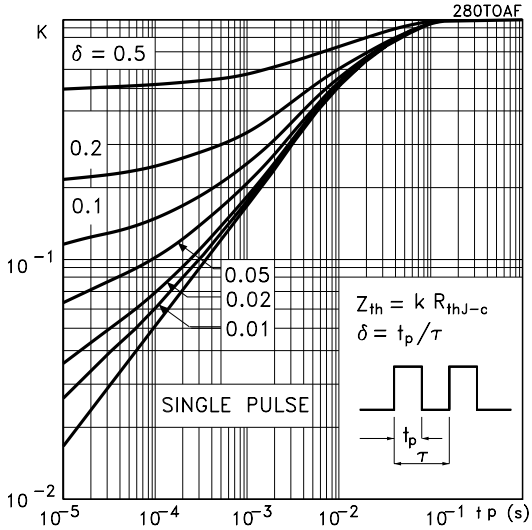
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	V_{cc} = 960 V, I_C = 7 A, R_{GE} = 1KΩ , V_{GE} = 15 V		4.9		µs
$t_r(V_{off})$	Off Voltage Rise Time			2.9		µs
t_f	Fall Time			3.3		µs
E_{off}(**)	Turn-off Switching Loss			15		mJ
t_c	Cross-over Time	V_{cc} = 960 V, I_C = 7 A, R_{GE} = 1KΩ , V_{GE} = 15 V Tj = 125 °C		7.5		µs
$t_r(V_{off})$	Off Voltage Rise Time			5.5		µs
t_f	Fall Time			6.2		µs
E_{off}(**)	Turn-off Switching Loss			22		mJ

COLLECTOR-EMITTER DIODE

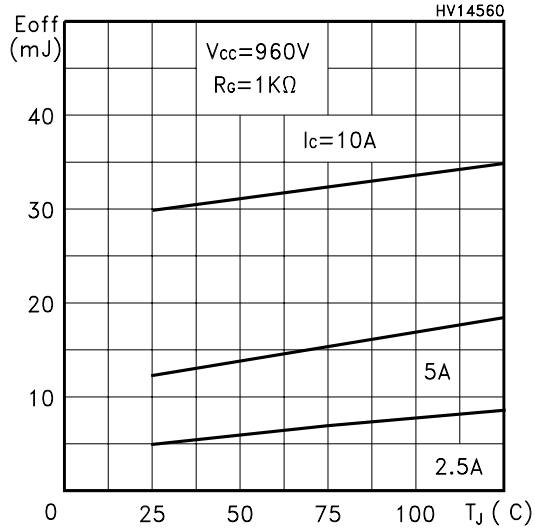
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_f I_{fm}	Forward Current Forward Current pulsed				3.5 28	A A
V_f	Forward On-Voltage	I_f =3.5 A I_f = 3.5 A, Tj = 125 °C		1.7 1.5	2.0	V V
t_{rr} Q_{rr} I_{rrm}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_f = 3.5 A ,V_R = 600 V, Tj =125°C, di/dt = 100A/µs		190 850 9		ns nC A

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)

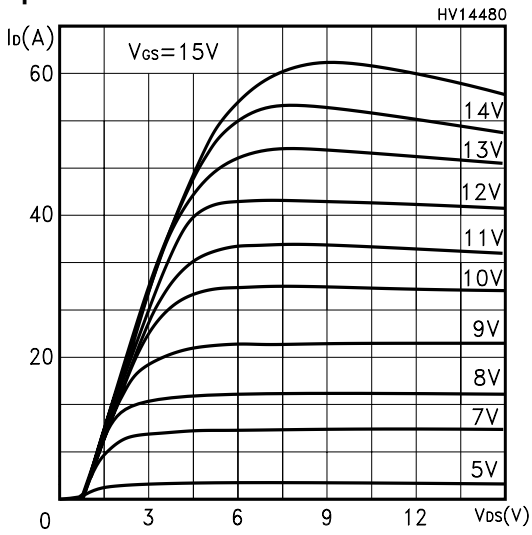
Thermal Impedance



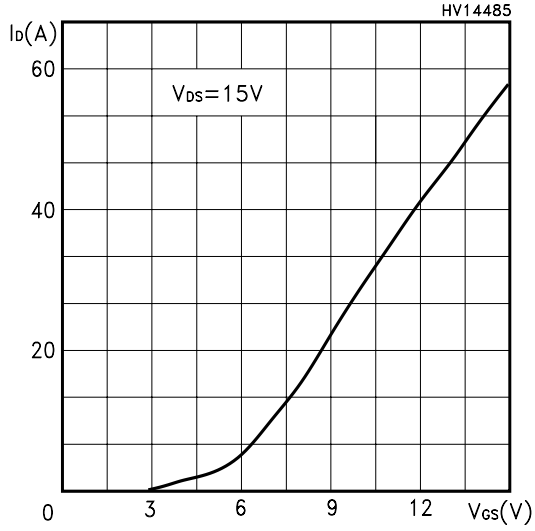
Turn-Off Energy Losses vs Temperature



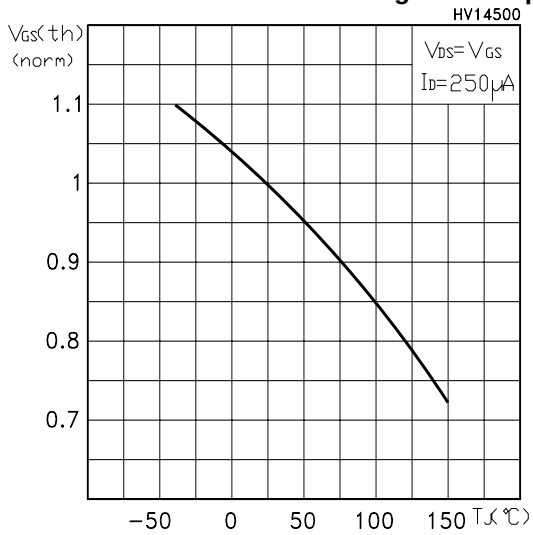
Output Characteristics



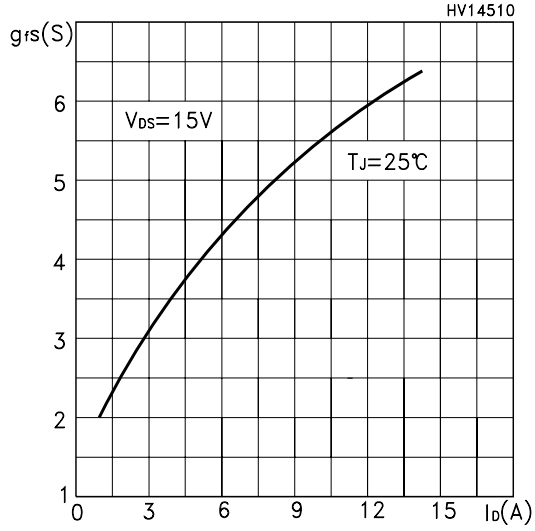
Transfer Characteristics



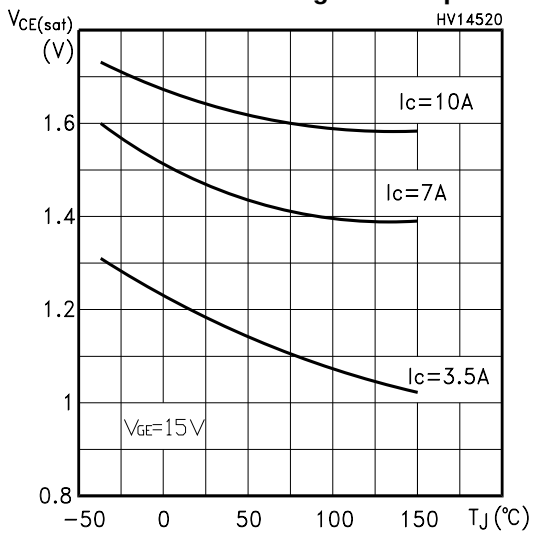
Normalized Gate Threshold Voltage vs Temp.



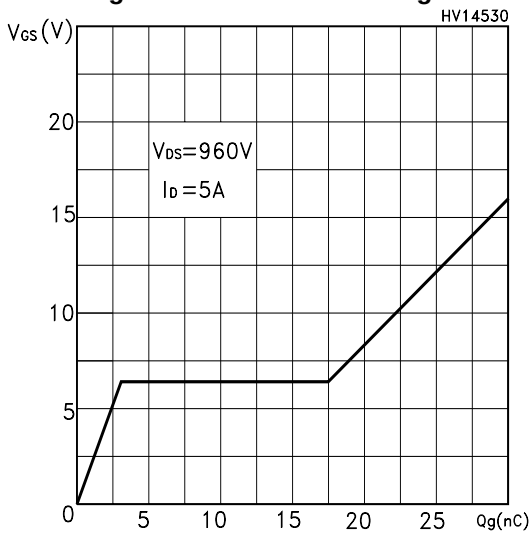
Transconductance



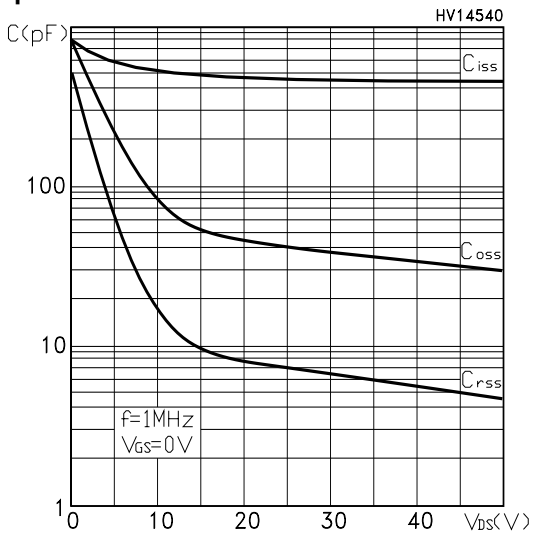
Collector-Emitter On Voltage vs Temperature



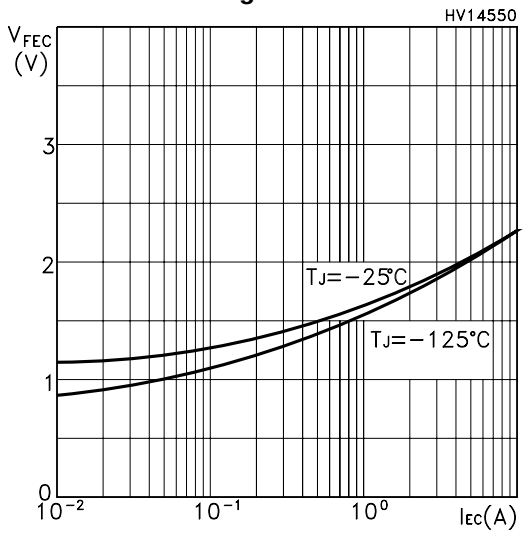
Gate-Charge vs Gate-Emitter Voltage



Capacitance Variations



Diode Forward Voltage



Collector-Emitter On Voltage vs Collector Current

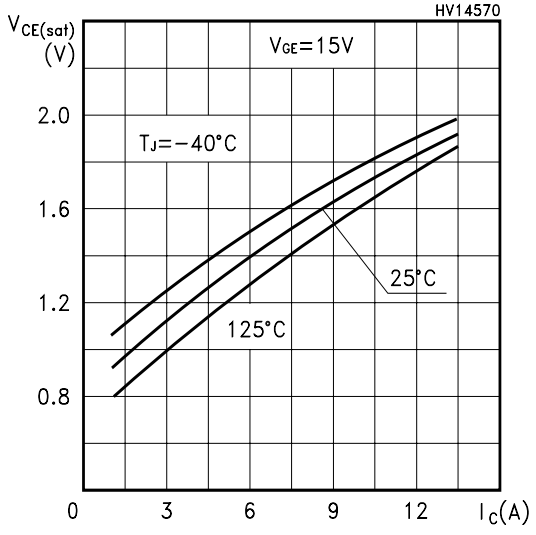


Fig. 1: Gate Charge test Circuit

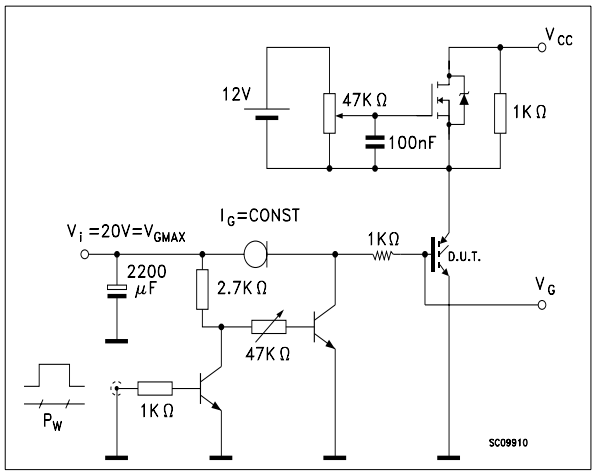
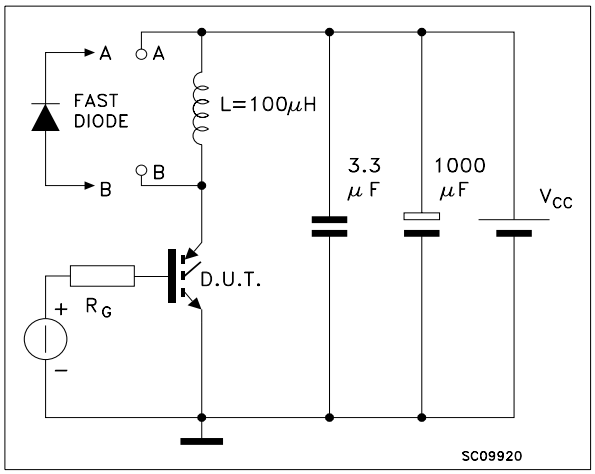
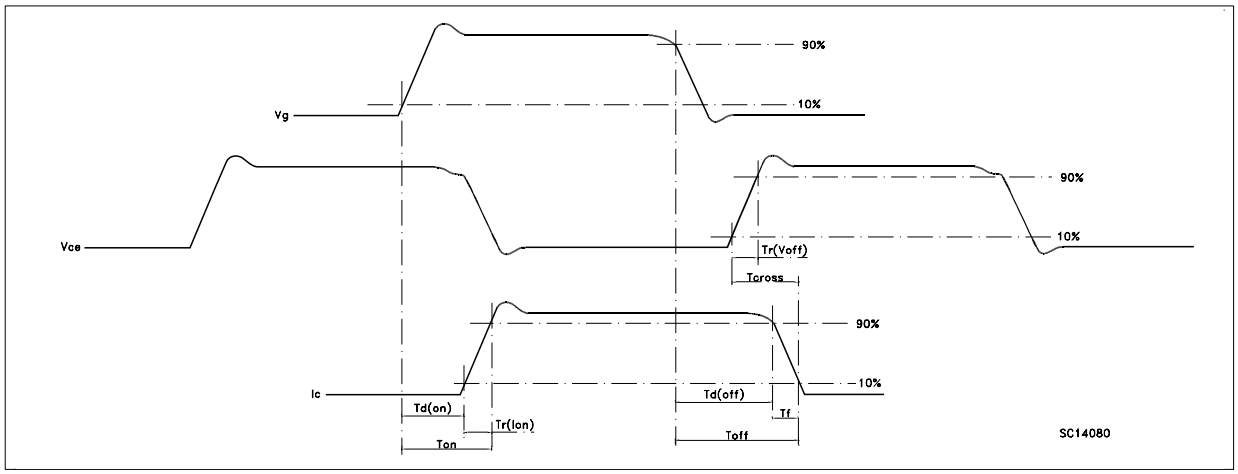


Fig. 2: Test Circuit For Inductive Load Switching





TO-220 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
C	1.23		1.32	0.048		0.051
D	2.40		2.72	0.094		0.107
D1		1.27			0.050	
E	0.49		0.70	0.019		0.027
F	0.61		0.88	0.024		0.034
F1	1.14		1.70	0.044		0.067
F2	1.14		1.70	0.044		0.067
G	4.95		5.15	0.194		0.203
G1	2.4		2.7	0.094		0.106
H2	10.0		10.40	0.393		0.409
L2		16.4			0.645	
L4	13.0		14.0	0.511		0.551
L5	2.65		2.95	0.104		0.116
L6	15.25		15.75	0.600		0.620
L7	6.2		6.6	0.244		0.260
L9	3.5		3.93	0.137		0.154
DIA.	3.75		3.85	0.147		0.151