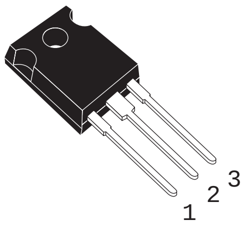
STGW20NB60H

N-CHANNEL 20A - 600V TO-247
PowerMESH™ IGBT

TYPE	V_{CES}	$V_{CE(sat)}$	I_C
STGW20NB60H	600 V	< 2.8 V	20 A

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



TO-247

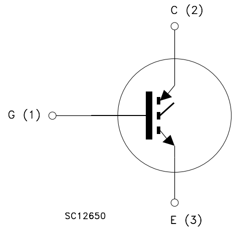
DESCRIPTION

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 perfomances. The suffix "H" identifies a family optimized to achieve very low switching times for high frequency applications (<120kHz).

APPLICATIONS

- HIGH FREQUENCY MOTOR CONTROLS
- WELDING EQUIPMENTS
- SMPS AND PFC IN BOTH HARD SWITCH AND RESONANT TOPOLOGIES

INTERNAL SCHEMATIC DIAGRAM



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	40	A
I_C	Collector Current (continuous) at T_c = 100 °C	20	A
I_{CM}(•)	Collector Current (pulsed)	160	A
P_{tot}	Total Dissipation at T_c = 25 °C	150	W
	Derating Factor	1.2	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

$R_{thj-case}$	Thermal Resistance Junction-case	Max	0.83	^{o}C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	30	oC/W
R_{thc-h}	Thermal Resistance Case-heatsink	Typ	0.1	^{o}C/W

ELECTRICAL CHARACTERISTICS (T_j = 25 ^{o}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_j = 25 ^{o}C V_{CE} = Max Rating T_j = 125 ^{o}C			10 100	µA µA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ± 20 V V_{CE} = 0			± 100	nA

ON (∗)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE} = V_{GE} I_C = 250 µA	3		5	V
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15 V I_C = 20 A V_{GE} = 15 V I_C = 20 A T_j = 125 ^{o}C		2.3 1.9	2.8	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} =25 V I_C = 20 A	7.0	10		S
C_{ies} C_{oes} C_{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25 V f = 1 MHz V_{GE} = 0	1200 140 28	1700 200 40	2200 260 52	pF pF pF
Q_G Q_{GE} Q_{GC}	Total Gate Charge Gate-Emitter Charge Gate-Collector Charge	V_{CE} = 480 V I_C = 20 A V_{GE} = 15 V		110 13 51	145	nC nC nC
I_{CL}	Latching Current	V_{clamp} = 480 V R_G=10 Ω T_j = 150 ^{o}C	80			A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Delay Time Rise Time	V_{CC} = 480 V I_C = 20 A V_{GE}= 15 V R_G = 10Ω		20 70		ns ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{CC} = 480 V I_C = 20 A R_G = 10 Ω V_{GE} = 15 V T_j = 125 ^{o}C		350		A/µs
E_{on}	Turn-on Switching Losses			300		µJ

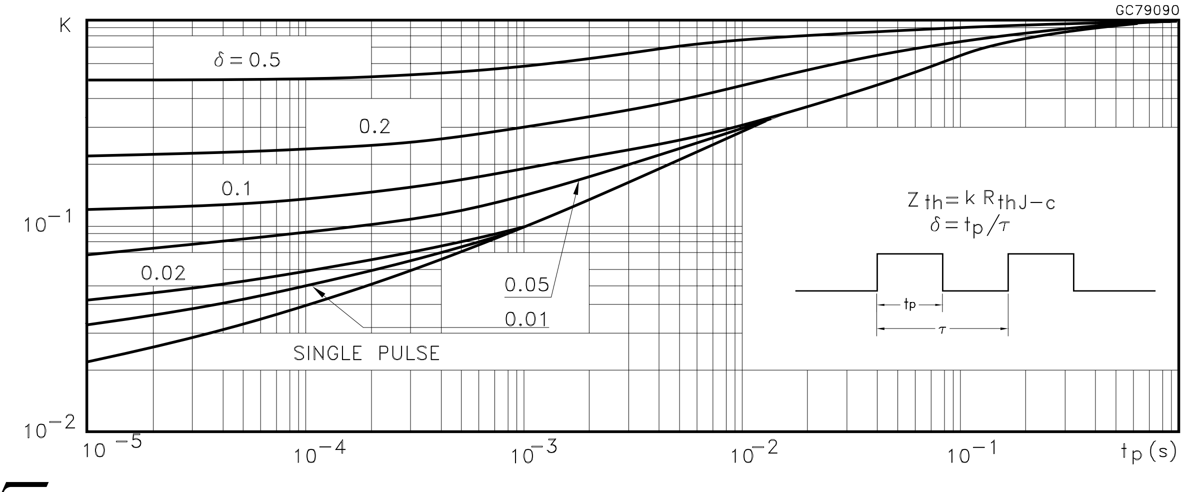
ELECTRICAL CHARACTERISTICS (continued)

SWITCHING OFF

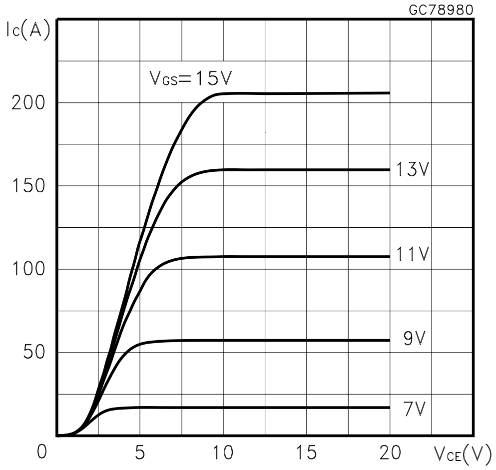
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c $t_r(v_{off})$ $t_d(_{off})$ t_f E_{off}(**) E_{ts}	Cross-Over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss Total Switching Loss	V_{CC} = 480 V I_C = 20 A R_{GE} = 10 Ω V_{GE} = 15 V		115 32 170 75 0.4 0.65		ns ns ns ns mJ mJ
t_c $t_r(v_{off})$ $t_d(_{off})$ t_f E_{off}(**) E_{ts}	Cross-Over Time Off Voltage Rise Time Delay Time Fall Time Turn-off Switching Loss Total Switching Loss	VCC = 480 V I_C = 20 A R_{GE} = 10 Ω V_{GE} = 15 V T_j = 125 °C		190 55 210 140 0.7 1.0		ns ns ns ns mJ mJ

(•) Pulse width limited by max. junction temperature
(∗) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %
(**)Losses Include Also The Tail (Jedec Standardization)

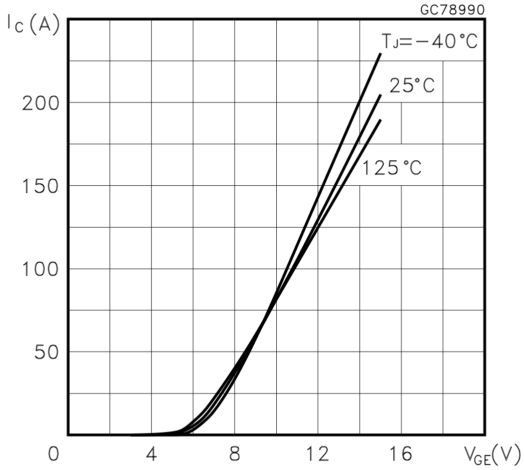
Thermal Impedance



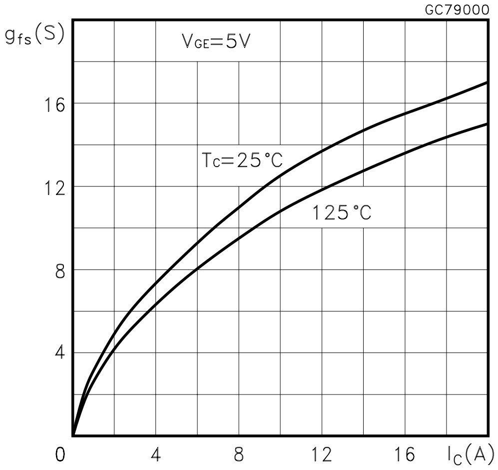
Output Characteristics



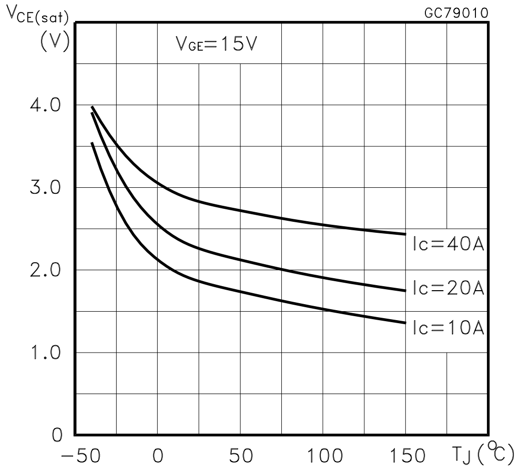
Transfer Characteristics



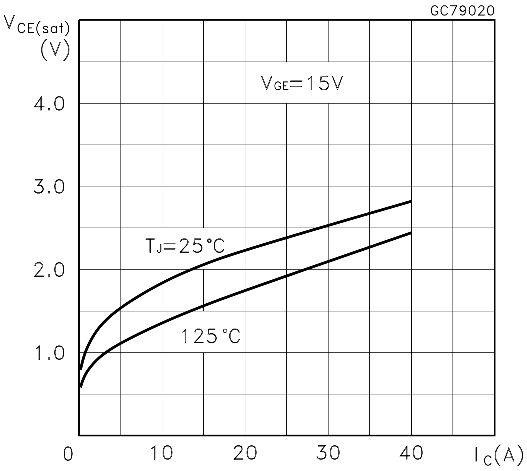
Transconductance



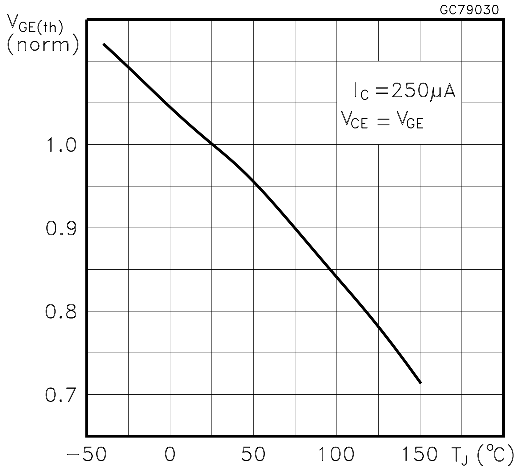
Collector-Emitter On Voltage vs Temperature



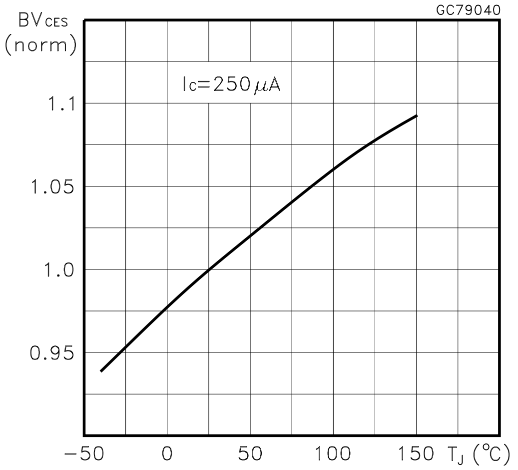
Collector-Emitter On Voltage vs Collector Current



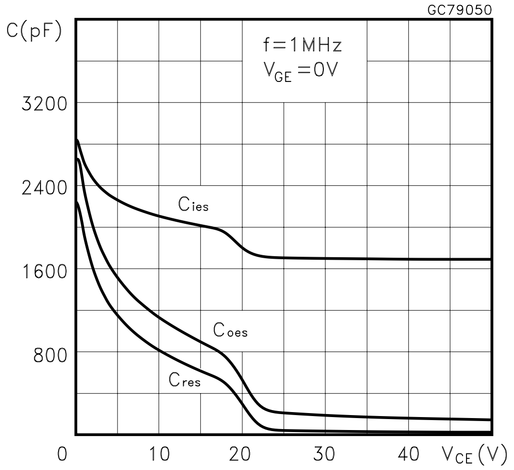
Gate Threshold vs Temperature



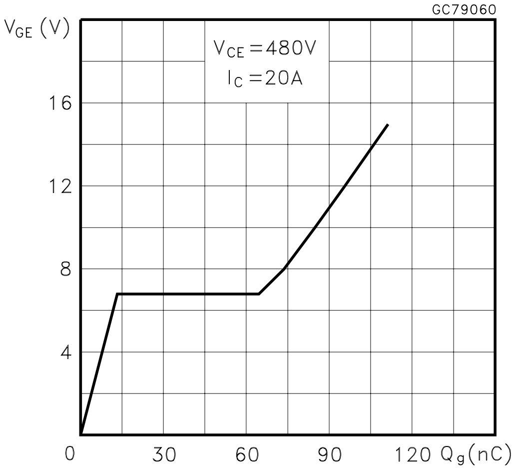
Normalized Breakdown Voltage vs Temperature



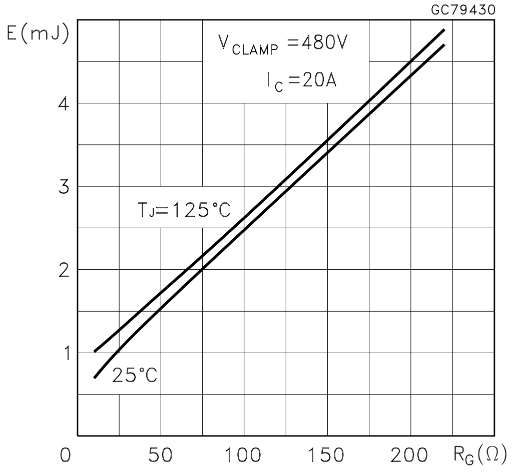
Capacitance Variations



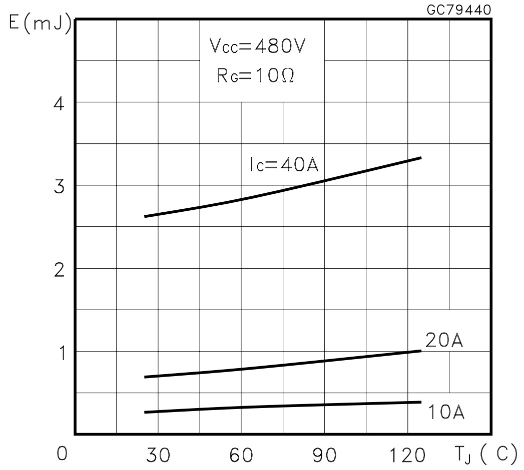
Gate Charge vs Gate-Emitter Voltage



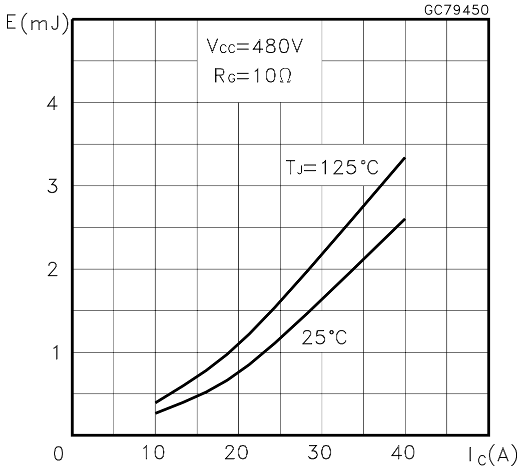
Total Switching Losses vs Gate Resistance



Total Switching Losses vs Temperature



Total Switching Losses vs Collector Current



Switching Off Safe Operating Area

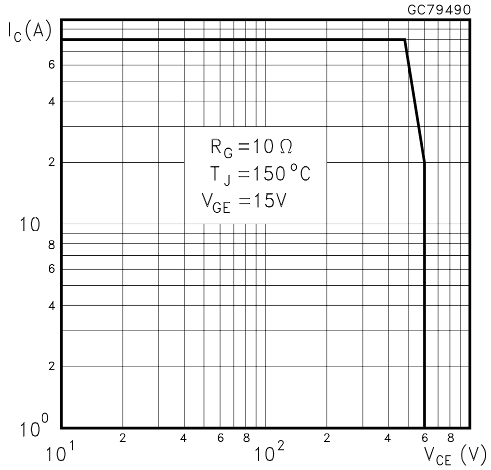


Fig. 1: Gate Charge test Circuit

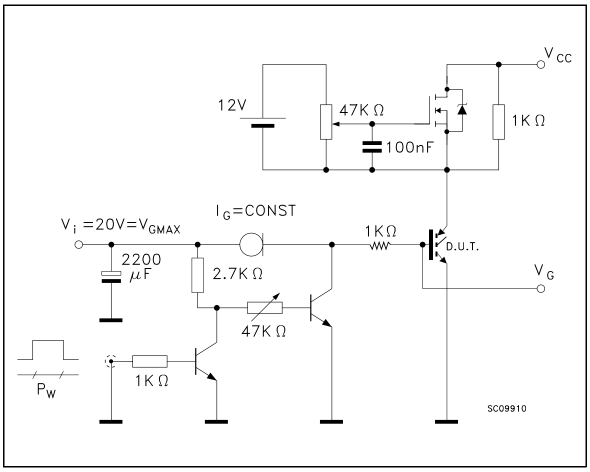


Fig. 2: Test Circuit For Inductive Load Switching

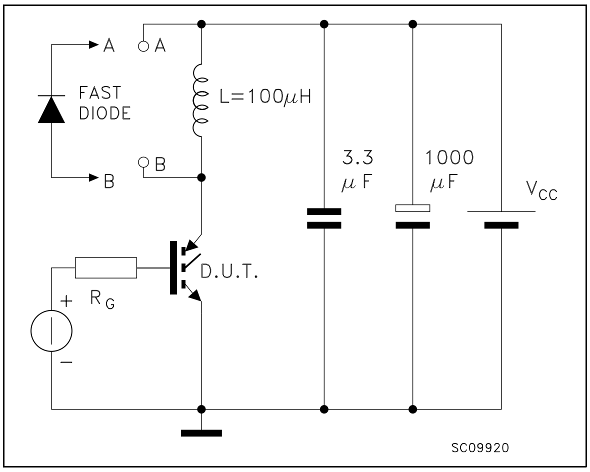
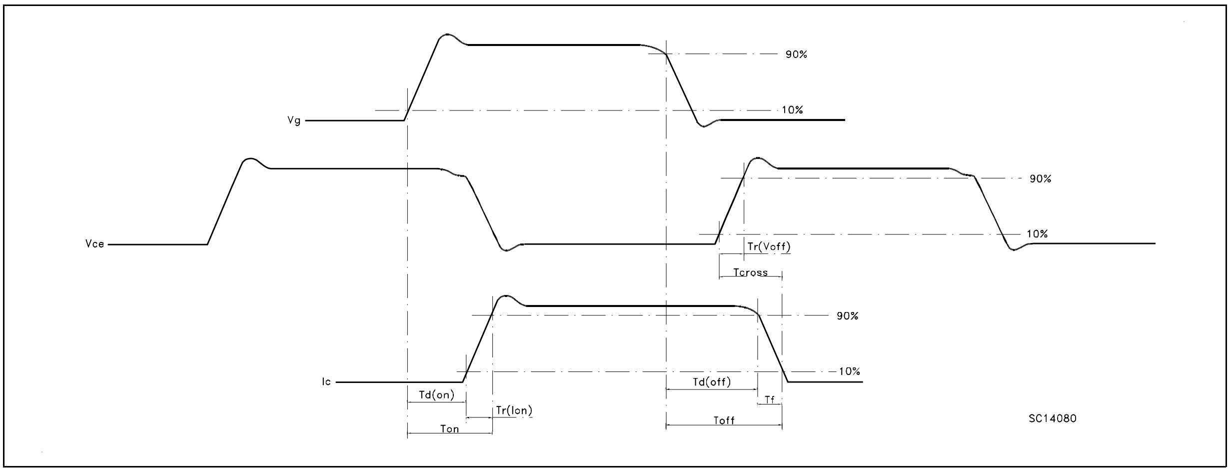
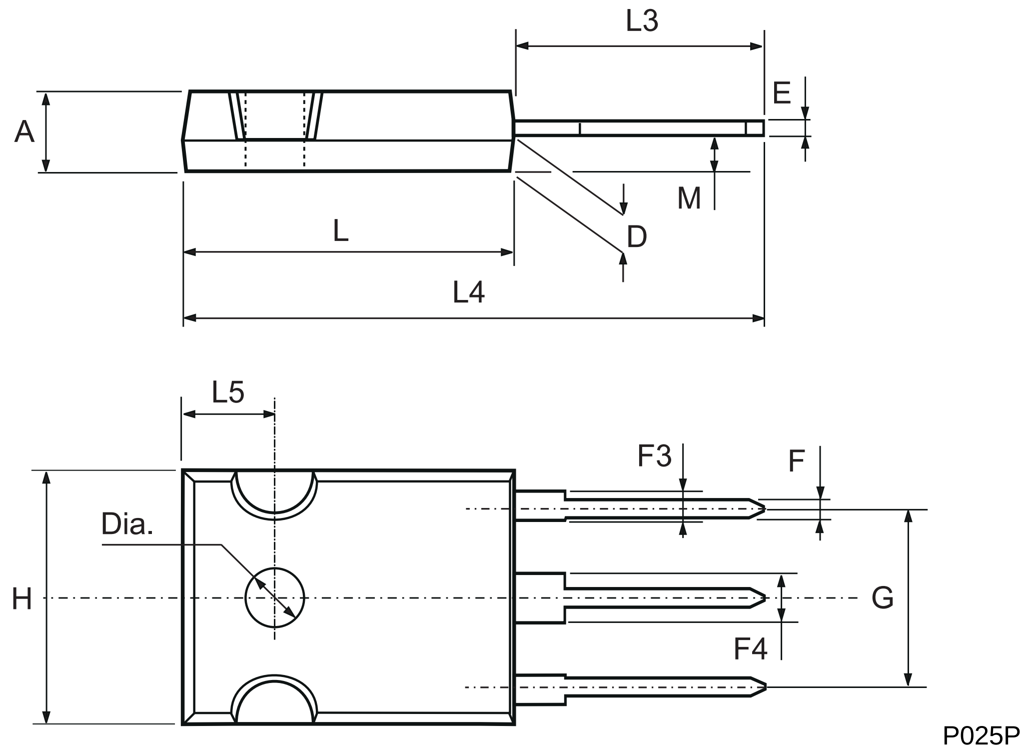


Fig. 3: Switching Waveforms



TO-247 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.7		5.3	0.185		0.209
D	2.2		2.6	0.087		0.102
E	0.4		0.8	0.016		0.031
F	1		1.4	0.039		0.055
F3	2		2.4	0.079		0.094
F4	3		3.4	0.118		0.134
G		10.9			0.429	
H	15.3		15.9	0.602		0.626
L	19.7		20.3	0.776		0.779
L3	14.2		14.8	0.559		0.582
L4		34.6			1.362	
L5		5.5			0.217	
M	2		3	0.079		0.118



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