



STGW50NB60H

N-CHANNEL 50A - 600V - TO-247

PowerMESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)} (Max)	I _C
STGW50NB60H	600 V	< 2.8 V	50 A

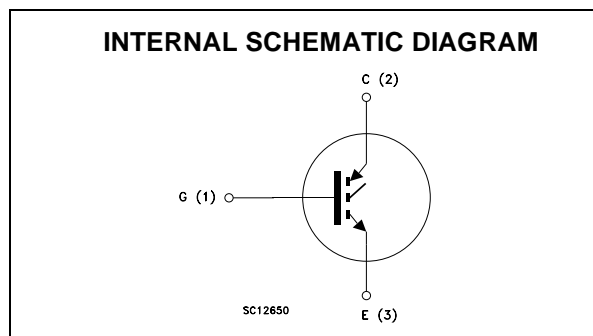
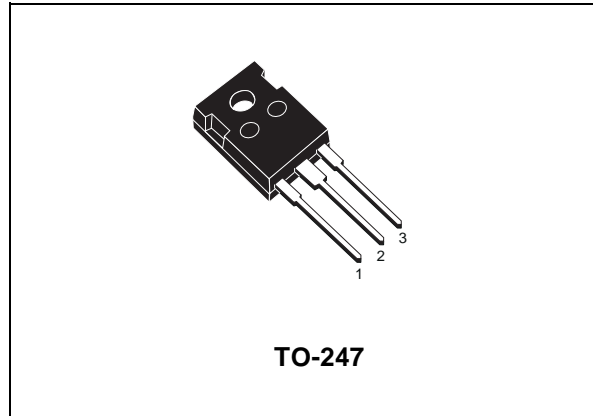
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- LOW ON-VOLTAGE DROP (V_{CESAT})
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- VERY HIGH FREQUENCY OPERATION
- OFF LOSSES INCLUDE TAIL CURRENT

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 "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



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{CES}	Collector-Emitter Voltage (V _{GS} = 0)	600	V
V _{ECR}	Emitter-Collettor Voltage	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

STGW50NB60H

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)}	Collectro-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 (*)

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 =50 A V _{GE} =15 V, I _C =30 A, T _C =125°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 = 50 A		22		S
C _{ies}	Input Capacitance	V _{CE} = 25 V, f = 1 MHz, V _{GE} = 0		4500		pF
C _{oes}	Output Capacitance			450		pF
C _{res}	Reverse Transfer Capacitance			90		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		260 28 115		nC nC nC
I _{CL}	Latching Current	V _{clamp} = 480 V, R _G = 10 Ω V _{GE} = 15 V, T _J = 150°C	300			A

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{d(on)}	Delay Time	V _{CC} = 480 V, I _C = 50 A V _{GE} = 15 V, R _G = 10Ω		30		ns
t _r	Rise Time			110		ns
(di/dt) _{on} E _{on}	Turn-on Current Slope Turn-on Switching Losses	V _{CC} = 480 V, I _C = 50 A, R _G =10 Ω V _{GE} = 15 V, T _J = 125°C		600 600		A/μs μJ

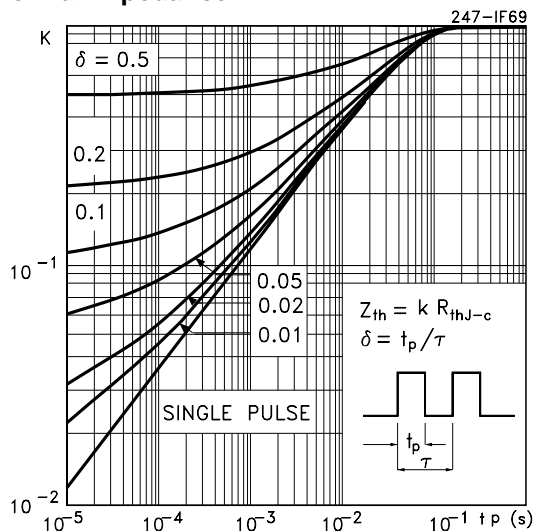
ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING OFF**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-over Time	$V_{CC} = 480 \text{ V}$, $I_C = 50 \text{ A}$, $R_{GE} = 10 \Omega$, $V_{GE} = 15 \text{ V}$		166		ns
$t_r(V_{off})$	Off Voltage Rise Time			48		ns
$t_{d(off)}$	Delay Time			326		ns
t_f	Fall Time			100		ns
$E_{off(**)}$	Turn-off Switching Loss			2.1		mJ
E_{ts}	Total Switching Loss			2.7		mJ
t_c	Cross-over Time	$V_{CC} = 480 \text{ V}$, $I_C = 50 \text{ A}$, $R_{GE} = 10 \Omega$, $V_{GE} = 15 \text{ V}$ $T_j = 125 \text{ }^\circ\text{C}$		270		ns
$t_r(V_{off})$	Off Voltage Rise Time			75		ns
$t_{d(off)}$	Delay Time			320		ns
t_f	Fall Time			200		ns
$E_{off(**)}$	Turn-off Switching Loss			2.9		mJ
E_{ts}	Total Switching Loss			3.5		mJ

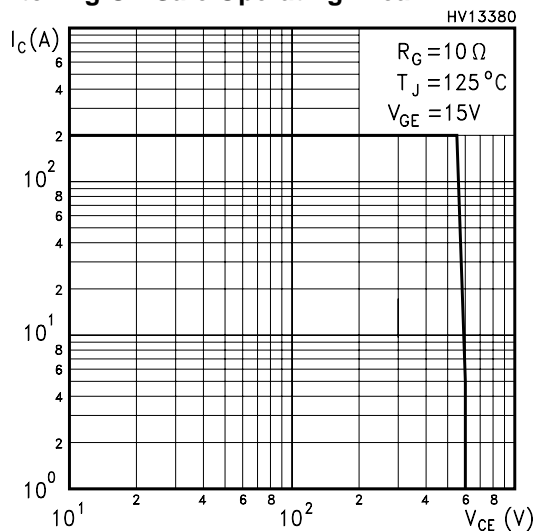
Note: (*)Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

(**)Losses include Also the Tail (Jedec Standardization)

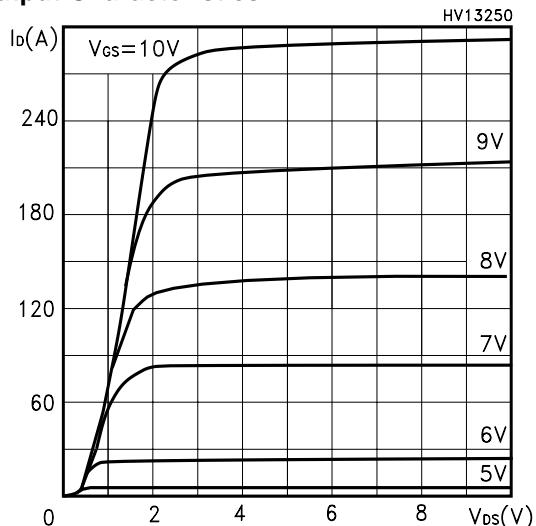
Thermal Impedance



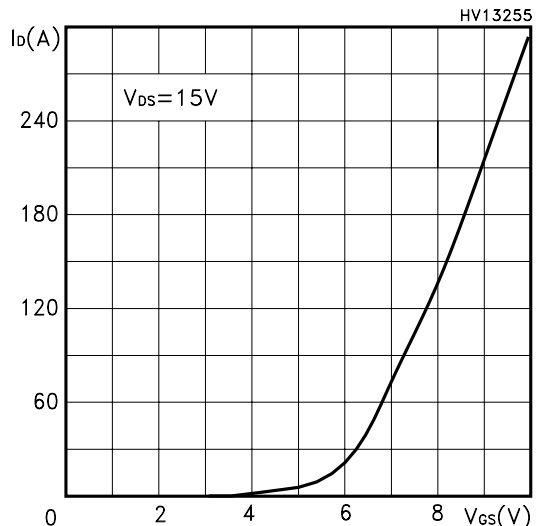
Switching Off Safe Operating Area



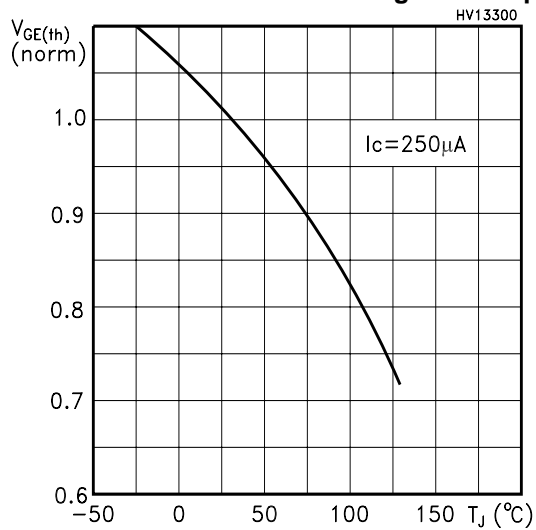
Output Characteristics



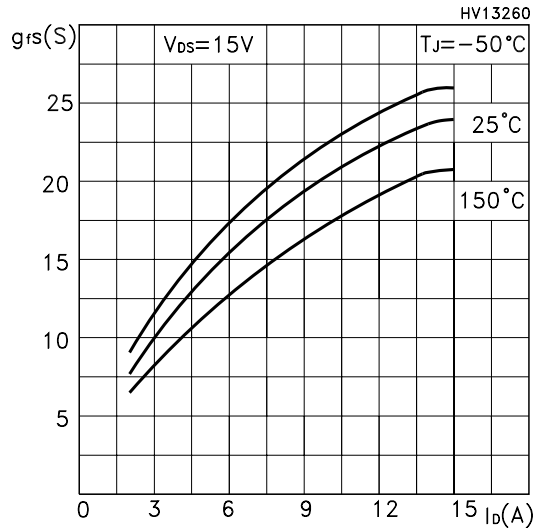
Transfer Characteristics



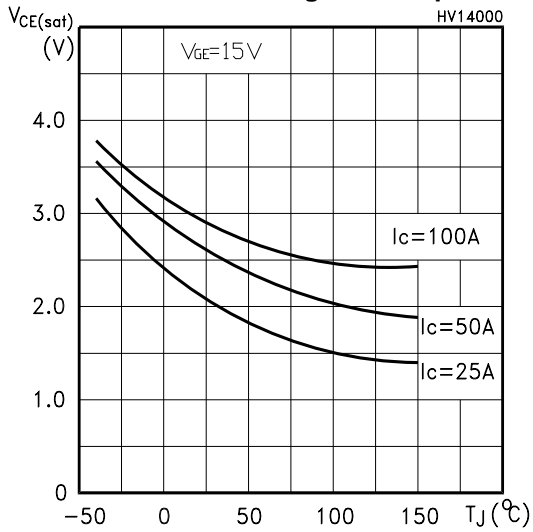
Normalized Gate Threshold Voltage vs Temp.



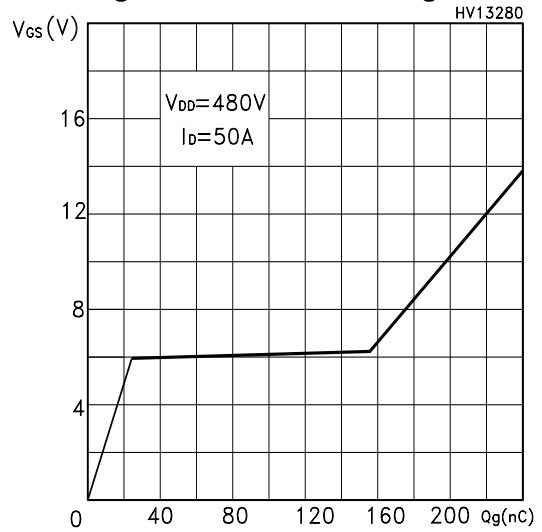
Transconductance



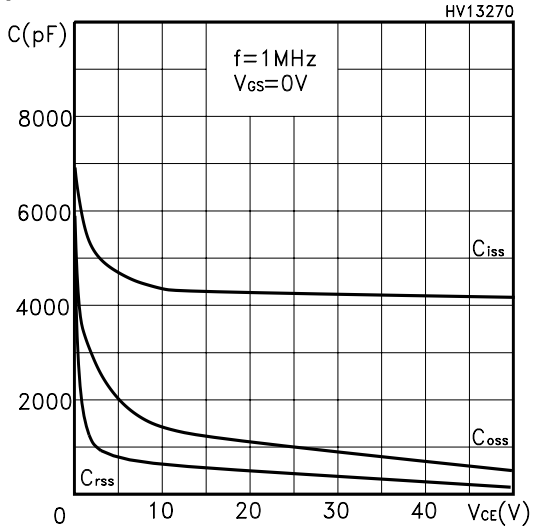
Collector-Emitter On Voltage vs Temperature



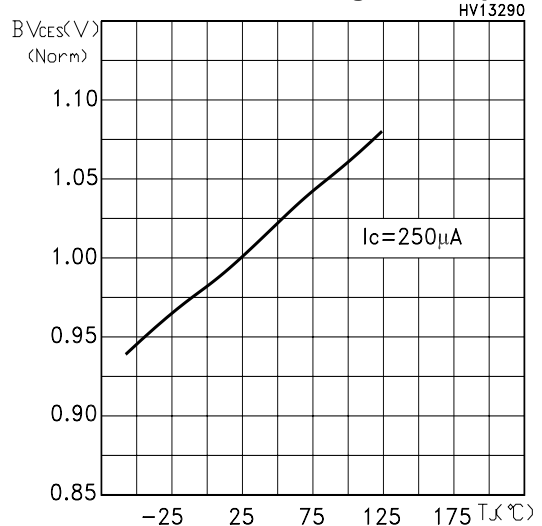
Gate-Charge vs Gate-Emitter Voltage



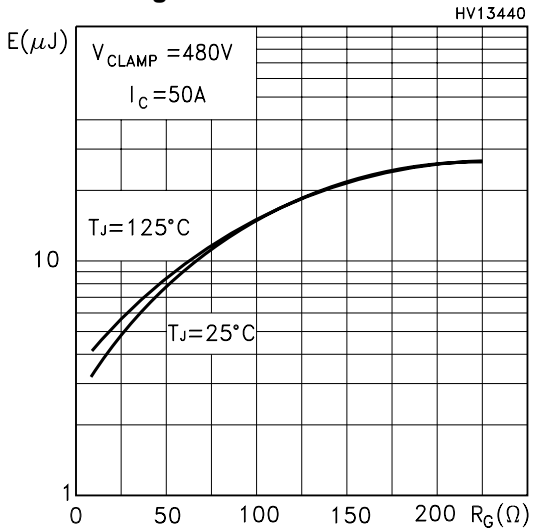
Capacitance Variations



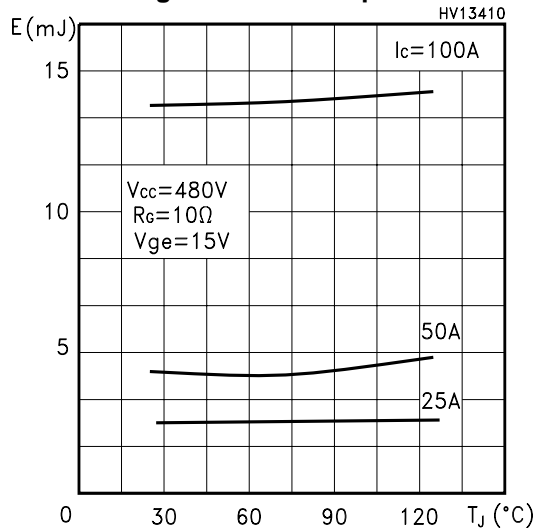
Normalized Break-down Voltage vs Temp.



Total Switching losses vs Gate Resistance



Total Switching losses vs Temperature



Total Switching losses vs Ic

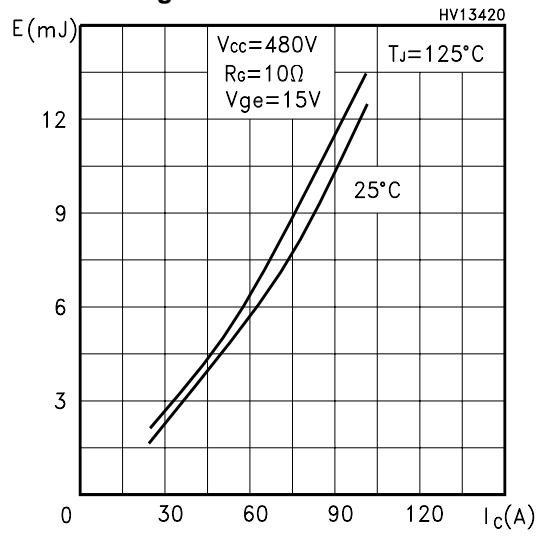


Fig. 1: Gate Charge test Circuit

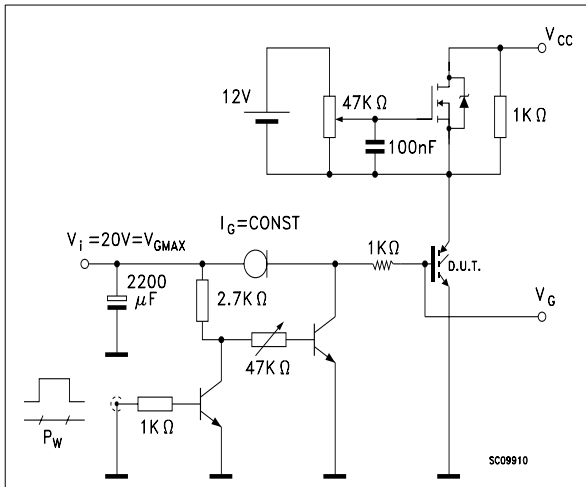


Fig. 2: Test Circuit For Inductive Load Switching

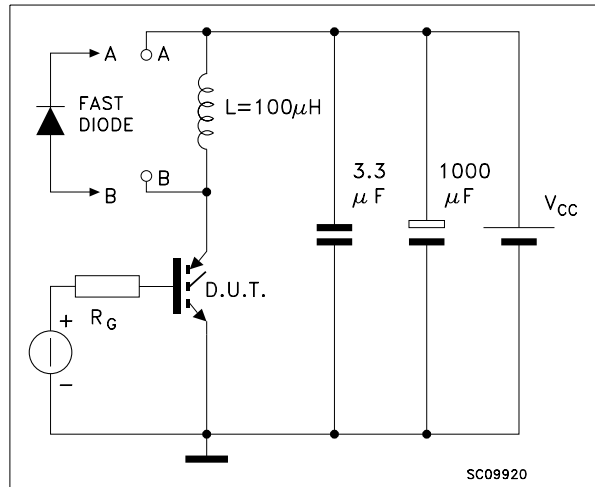
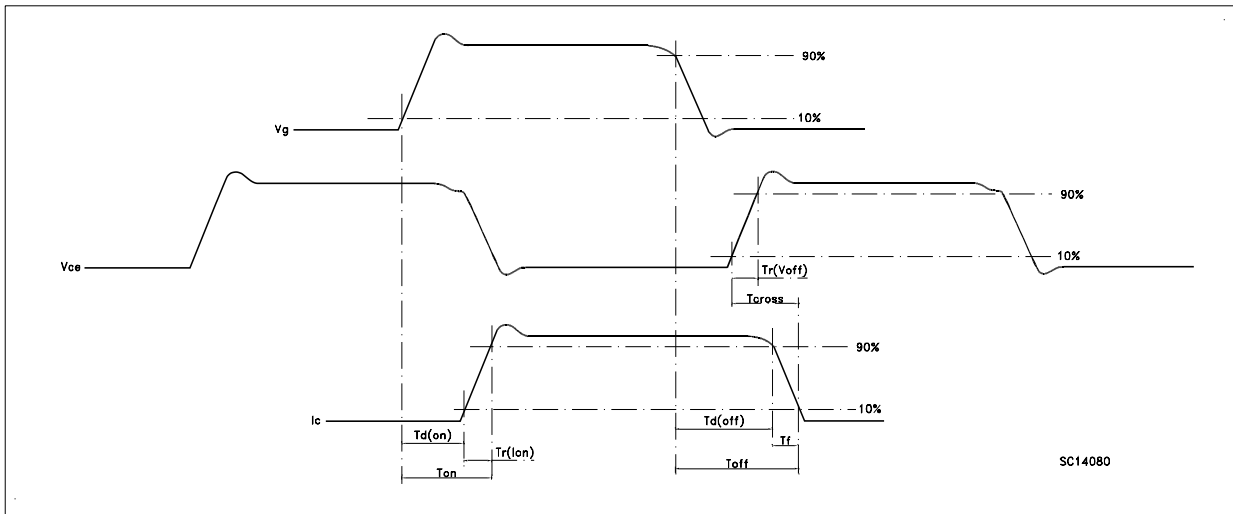
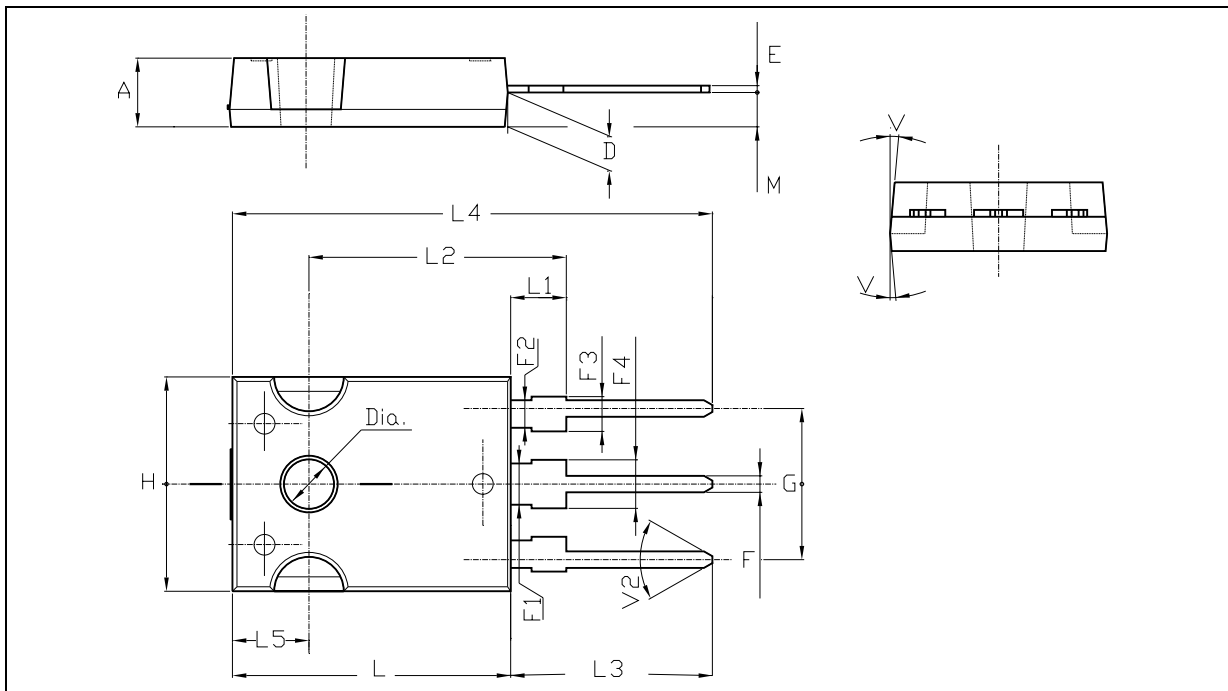


Fig. 3: Switching Waveforms



TO-247 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.85		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		5°			5°	
V2		60°			60°	
Dia	3.55		3.65	0.14		0.143



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