



STGD7NB60S

N-CHANNEL 7A - 600V DPAK Power MESH™ IGBT

TYPE	V _{CES}	V _{CE(sat)}	I _C
STGD7NB60S	600 V	< 1.6 V	7 A

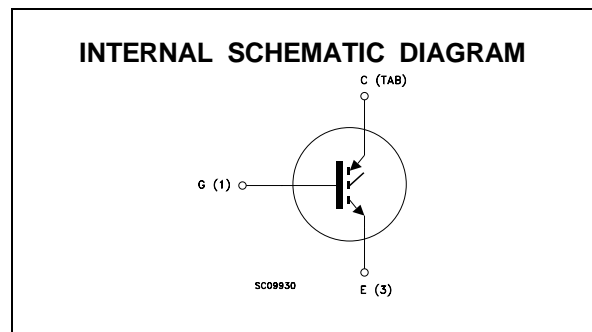
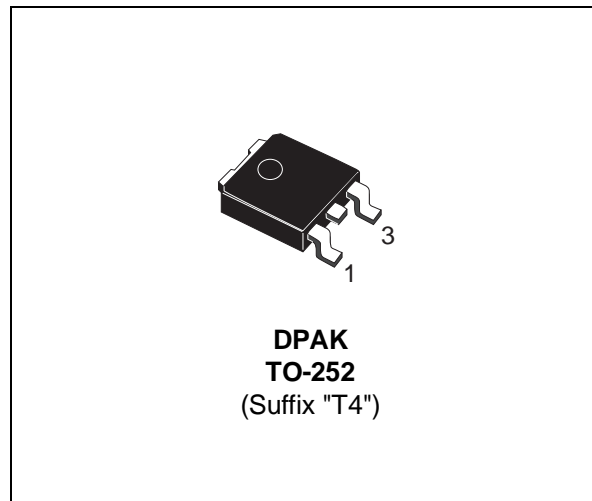
- HIGH INPUT IMPEDANCE (VOLTAGE DRIVEN)
- VERY LOW ON-VOLTAGE DROP (V_{cesat})
- HIGH CURRENT CAPABILITY
- OFF LOSSES INCLUDE TAIL CURRENT
- SURFACE-MOUNTING DPAK (TO-252) POWER PACKAGE IN TAPE & REEL (SUFFIX "T4")

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

APPLICATIONS

- LIGHT DIMMER
- STATIC RELAYS
- MOTOR CONTROL



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	15	A
I _C	Collector Current (continuous) at T _c = 100 °C	7	A
I _{CM} (•)	Collector Current (pulsed)	60	A
P _{tot}	Total Dissipation at T _c = 25 °C	55	W
	Derating Factor	0.44	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

STGD7NB60S

THERMAL DATA

R _{thj-case}	Thermal Resistance Junction-case	Max	2.27	°C/W
R _{thj-amb}	Thermal Resistance Junction-ambient	Max	100	°C/W
R _{thc-sink}	Thermal Resistance Case-sink	Typ	1.5	°C/W

ELECTRICAL CHARACTERISTICS (T_j = 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
V _{BR(ECR)}	Emitter-Collector Breakdown Voltage	I _C = 1 mA V _{GE} = 0	20			V
I _{CES}	Collector cut-off (V _{GE} = 0)	V _{CE} = Max Rating T _j = 25 °C V _{CE} = Max Rating T _j = 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	2.5		5	V
V _{CE(SAT)}	Collector-Emitter Saturation Voltage	V _{GE} = 15 V I _C = 3 A V _{GE} = 15 V I _C = 7 A V _{GE} = 15 V I _C = 7 A T _j = 125 °C		1 1.2 1.1	1.4 1.6	V V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{CE} = 25 V I _C = 7 A	4			S
C _{ies} C _{oes} C _{res}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{CE} = 25 V f = 1 MHz V _{GE} = 0		610 65 12	780 85 15	pF pF pF
Q _G	Gate Charge	V _{CE} = 400 V I _C = 7 A V _{GE} = 15 V		33		nC
I _{CL}	Latching Current	V _{clamp} = 480 V R _G = 1kΩ T _j = 150 °C	15			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 = 7 A V _{GE} = 15 V R _G = 1 KΩ		0.7 0.46		μs μs
(di/dt) _{on}	Turn-on Current Slope	V _{CC} = 480 V I _C = 7 A R _G = 1 KΩ V _{GE} = 15 V		8		A/μs
E _{on}	Turn-on Switching Losses	T _j = 125 °C		0.4		mJ

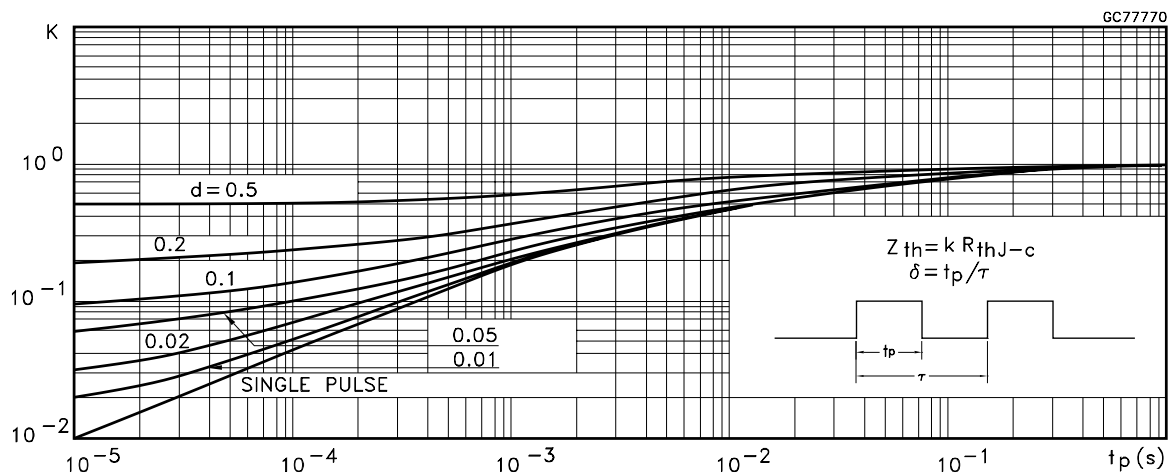
ELECTRICAL CHARACTERISTICS (continued)

SWITCHING OFF

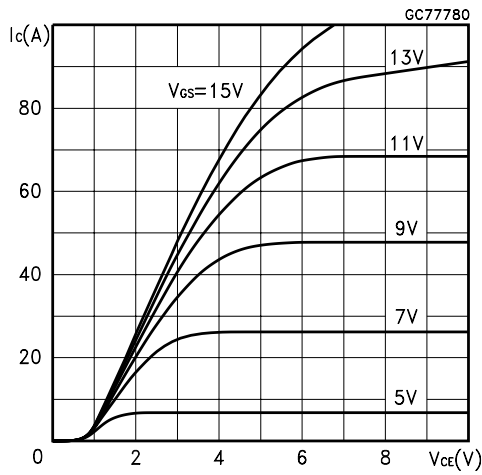
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-Over Time	$V_{CC} = 480\text{ V}$		2.2		μs
$t_r(V_{off})$	Off Voltage Rise Time	$R_{GE} = 100\ \Omega$		1.2		μs
t_f	Fall Time	$I_C = 7\text{ A}$ $V_{GE} = 15\text{ V}$		1.2		μs
$E_{off(**)}$	Turn-off Switching Loss			3.5		mJ
t_c	Cross-Over Time	$V_{CC} = 480\text{ V}$		3.8		μs
$t_r(V_{off})$	Off Voltage Rise Time	$R_{GE} = 100\ \Omega$		1.2		μs
t_f	Fall Time	$T_j = 125\text{ }^\circ\text{C}$		1.9		μs
$E_{off(**)}$	Turn-off Switching Loss			5.3		mJ

- (●) Pulse width limited by safe operating area
- (*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %
- (**) Losses Include Also The Tail (Jedec Standardization)

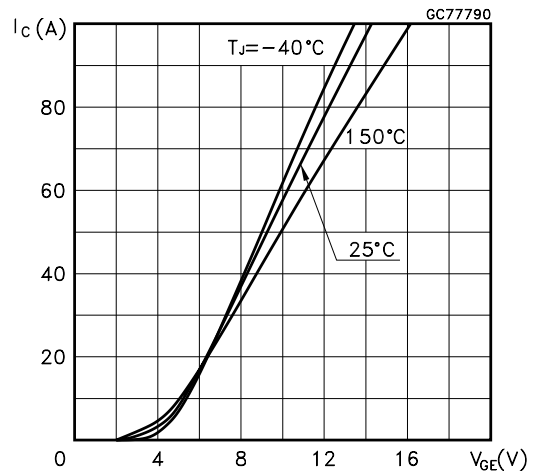
Thermal Impedance



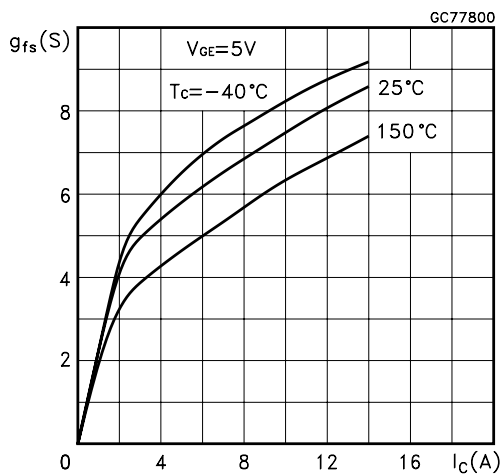
Output Characteristics



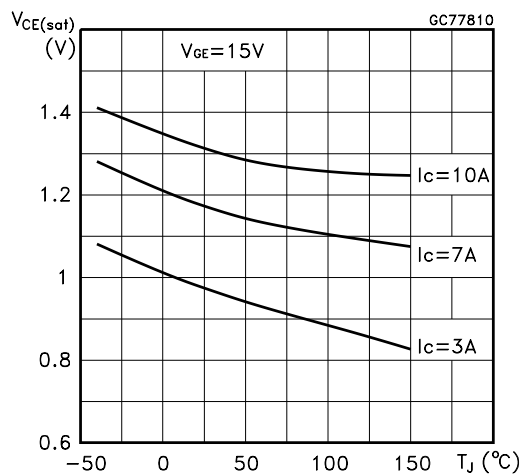
Transfer Characteristics



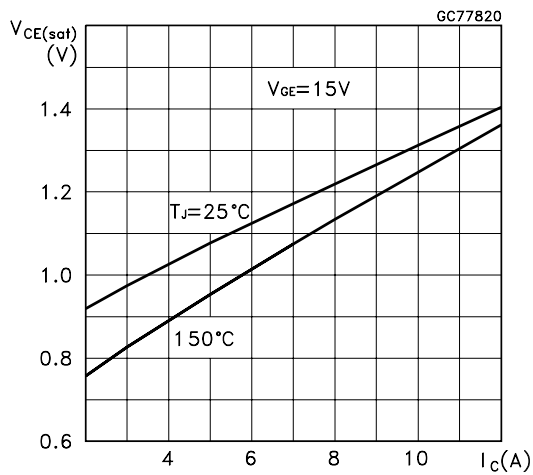
Transconductance



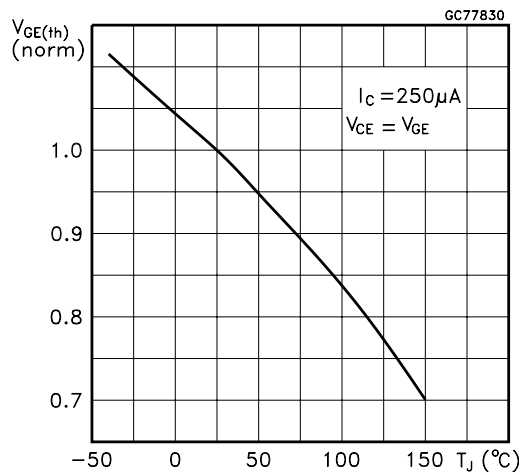
Collector-Emitter On Voltage vs Temperature



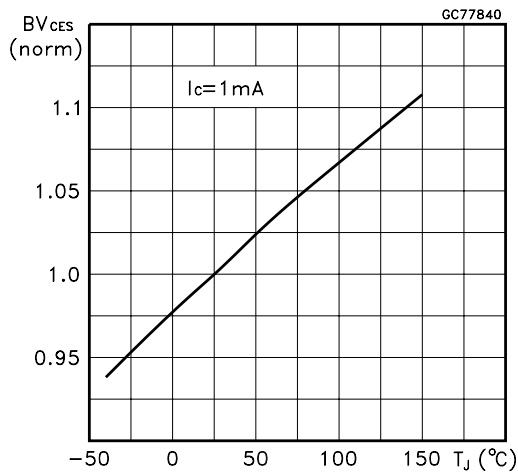
Collector-Emitter On Voltage vs Collector Current



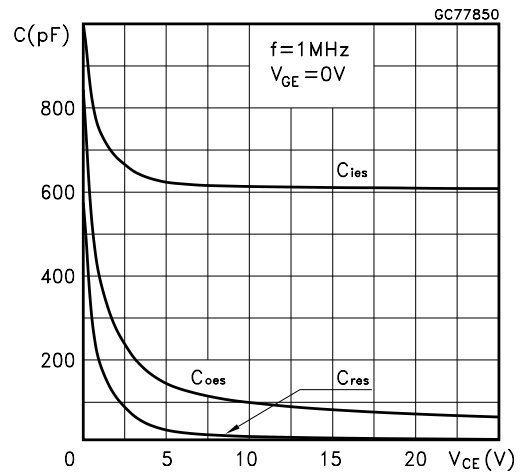
Gate Threshold vs Temperature



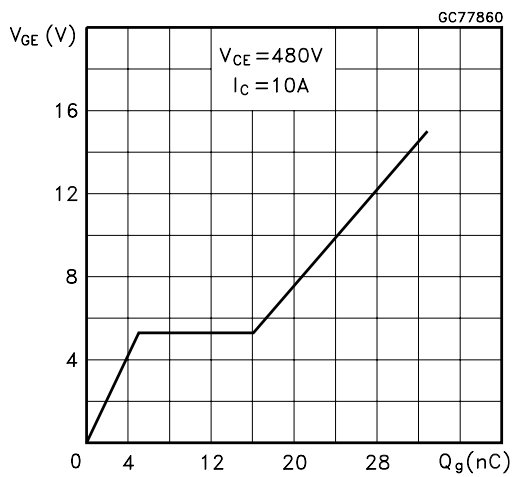
Normalized Breakdown Voltage vs Temperature



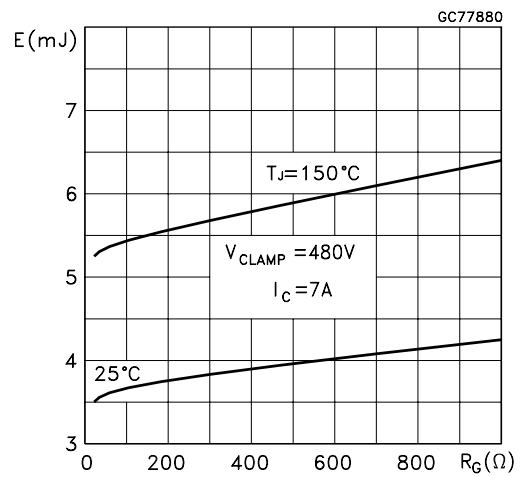
Capacitance Variations



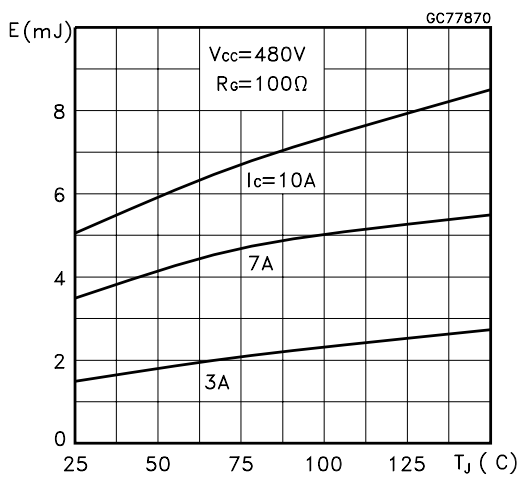
Gate Charge vs Gate-Emitter Voltage



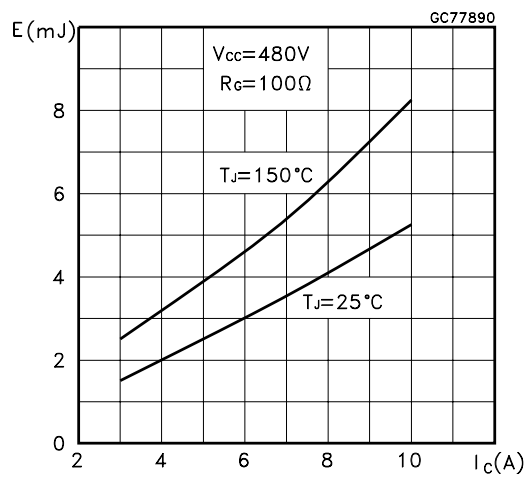
Off Losses vs Gate Resistance



Off Losses vs Temperature



Off Losses vs Collector Current



Switching Off Safe Operatin Area

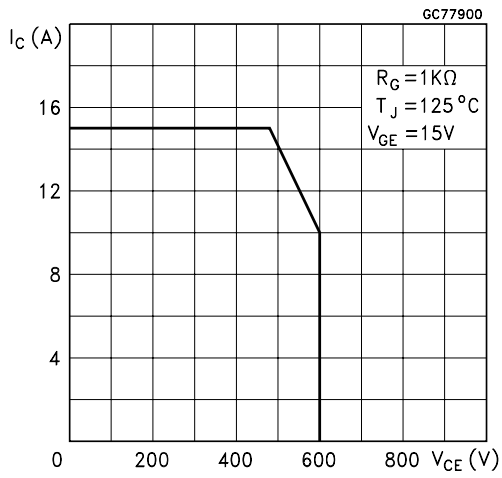


Fig. 1: Gate Charge test Circuit

Fig. 2: Test Circuit For Inductive Load Switching

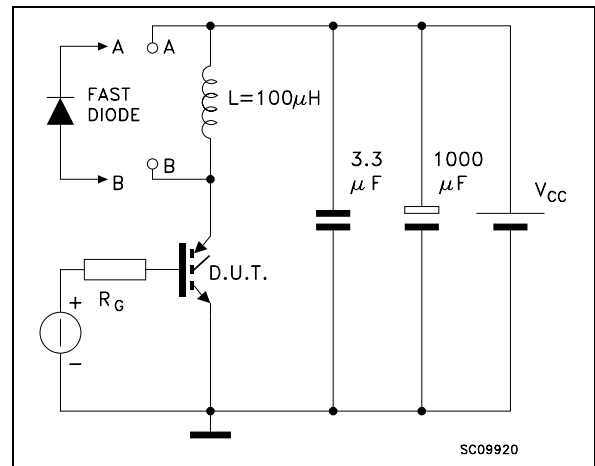
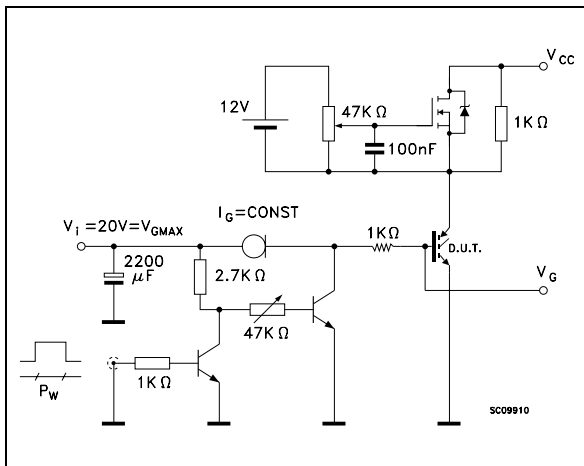
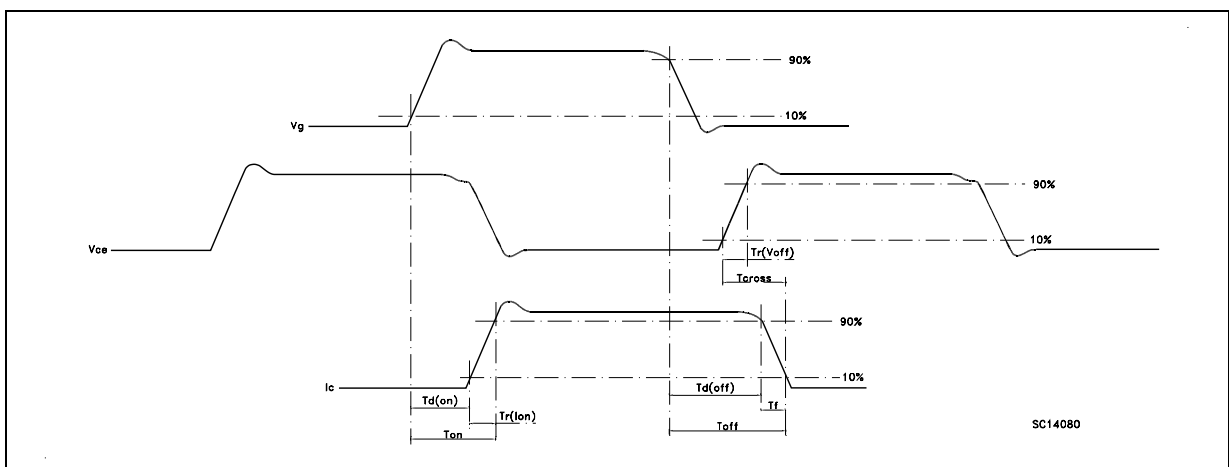
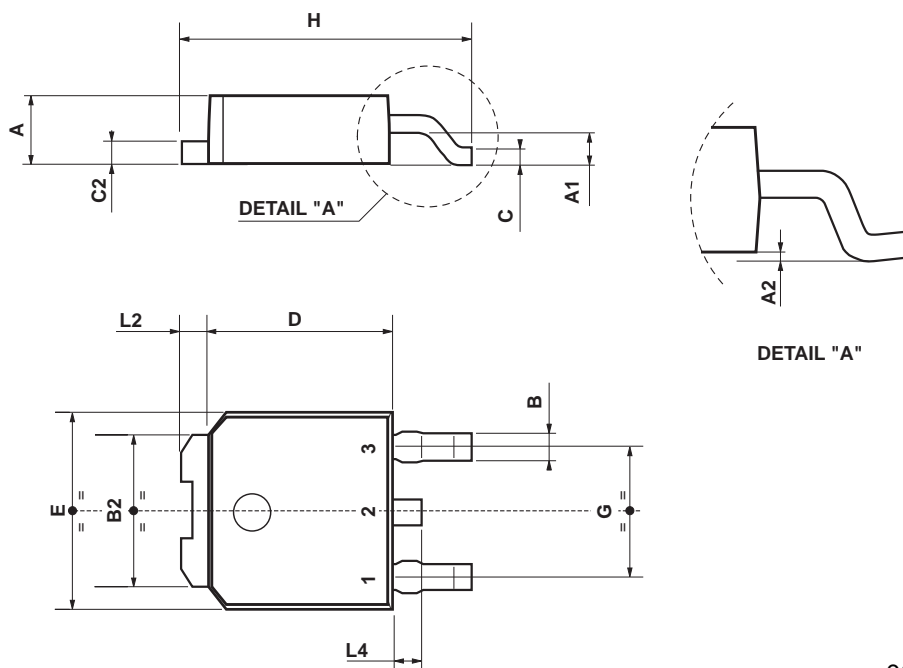


Fig. 3: Switching Waveforms



TO-252 (DPAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.2		2.4	0.086		0.094
A1	0.9		1.1	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.9	0.025		0.035
B2	5.2		5.4	0.204		0.212
C	0.45		0.6	0.017		0.023
C2	0.48		0.6	0.019		0.023
D	6		6.2	0.236		0.244
E	6.4		6.6	0.252		0.260
G	4.4		4.6	0.173		0.181
H	9.35		10.1	0.368		0.397
L2		0.8			0.031	
L4	0.6		1	0.023		0.039



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