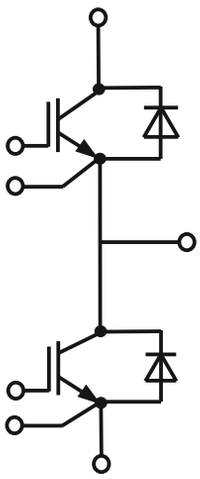
IGBT Module, 1200V/75A

Features

- FS Trench technology
- Low switching losses
- $V_{CE(sat)}$ with positive temperature coefficient
- Low saturation voltage, $V_{CE(sat)}$

Applications

- AC inverter drives
- Servo drives
- UPS systems
- Power supplies



Absolute Maximum Ratings (T_C = 25^{0}C unless otherwise noted)

IGBT				
Parameter	**Conditions**	**Symbol**	**Values**	**Units**
Collector-to-Emitter Voltage		V_{CE}	1200	V
Gate-to-Emitter Voltage		V_{GE}	± 30	V
DC Collector Current	T_j = 25^{0}C	I_C	150	A
	T_j = 100^{0}C		75	
Pulsed Collector Current		I_{CM}	300	A
Short circuit withstand time	V_{GE} = 15V, V_{CC} = 600V, V_{CES} < 650V, T_j = 150^{0}C	T_{sc}	6	µs

Diode				
Parameter	**Conditions**	**Symbol**	**Values**	**Units**
Peak Repetitive Reverse Voltage		V_{RRM}	1200	V
DC Blocking Voltage		V_R	1200	V
Average Rectified Forward Current		$I_{F(AV)}$	75	A
Repetitive Peak Surge Current		I_{FRM}	150	A
Non-repetitive Peak Surge Current	t_p = 10 ms	I_{FSM}	600	A

Module				
Parameter	**Conditions**	**Symbol**	**Values**	**Units**
Junction Temperature Range		T_{jmax}	-45…+175	^{0}C
Operating Junction Temperature		T_{jop}	-45…+150	^{0}C
Storage Temperature Range		T_{stg}	-45…+150	^{0}C
Isolation Voltage	f = 50Hz, t = 1 min.	V_{iso}	4000	V

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Electrical Characteristics (T_C = 25^{0}C unless otherwise noted)

IGBT						
Parameter	**Conditions**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**
Collector-to-Emitter Breakdown Voltage	I_C = 250 µA, V_{GE} = 0V, T_j = 25^{0}C	$V_{(BR)CES}$	1200	-	-	V
Collector-to-Emitter Leakage Current	V_{CE} = 1200V, V_{GE} = 0V, T_j = 25^{0}C	I_{CES}	-	-	20	µA
	V_{CE} = 1200V, V_{GE} = 0V, T_j = 150^{0}C		-	-	1.0	mA
Gate-to-Emitter Leakage Current	V_{GE} = ± 30V, V_{CE} = 0V, T_j = 25^{0}C	I_{GES}	-	-	± 200	nA
	V_{GE} = ± 30V, V_{CE} = 0V, T_j = 150^{0}C		-	-	± 400	
Gate Threshold Voltage	V_{CE} = V_{GE}, I_C = 250 µA	$V_{GE(th)}$	4.5	5.8	7.5	V
Collector-emitter saturation voltage	V_{GE} = 15V, I_C = 75A, T_j = 25^{0}C	V_{CEsat}	-	2.0	2.4	V
	V_{GE} = 15V, I_C = 75A, T_j = 150^{0}C		-	2.5	-	
Input Capacitance	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz, T_a = 25^{0}C	C_{iss}	-	9380	-	pF
Output Capacitance		C_{oss}	-	230	-	
Reverse Transfer Capacitance		C_{rss}	-	110	-	
Turn-on delay time	V_{CE} = 600V, I_C = 75A, R_g = 10Ω, V_{GE} = 15V, Tj = 25^{0}C	$t_{d(on)}$	-	92	-	ns
Rise time		t_r	-	165	-	ns
Turn-off delay time		$t_{d(off)}$	-	260	-	ns
Fall time		t_f	-	92	-	ns
Turn-on energy		E_{on}	-	6.15	-	mJ
Turn-off energy		E_{off}	-	3.15	-	mJ
Total switching energy		E_{ts}	-	9.30	-	mJ
Turn-on delay time	V_{CE} = 600V, I_C = 75A, R_g = 10Ω, V_{GE} = 15V, Tj = 150^{0}C	$t_{d(on)}$	-	76	-	ns
Rise time		t_r	-	140	-	ns
Turn-off delay time		$t_{d(off)}$	-	315	-	ns
Fall time		t_f	-	213	-	ns
Turn-on energy		E_{on}	-	5.63	-	mJ
Turn-off energy		E_{off}	-	4.46	-	mJ
Total switching energy		E_{ts}	-	10.09	-	mJ
Gate charge	V_{CE} = 960V, I_C = 75A, V_{GE} = 15V	Q_g	-	340	-	nC

Diode						
Parameter	**Conditions**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**
Diode forward voltage	I_F = 75A, Tj = 25^{0}C	V_F	-	2.7	3.5	V
	I_F = 75A, Tj = 150^{0}C		-	1.7	-	
Diode reverse recovery time	I_F = 0.5A, I_R = 1.0A, I_{rr} = 0.25A	t_{rr}	-	50	-	ns
Diode reverse recovery time	I_F = 75A, di/dt = 200 A/µS V_R = 600V	t_{rr}	-	105	-	ns
Diode peak reverse recovery current		I_{RRM}	-	5	-	A
Diode reverse recovery charge		Q_{rr}	-	255	-	nC
Maximum Instantaneous Reverse	V_R = 1200V, Tj = 25^{0}C	I_R	-	-	5.0	µA
	V_R = 1200V, Tj = 150^{0}C		-	-	1.0	mA

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Module						
Parameter	**Conditions**	**Symbol**	**Min.**	**Typ.**	**Max.**	**Units**
Stray inductance		L_{CE}			30	nH
Thermal resistance	per IGBT	$R_{th(j-c)}$			0.28	^{0}C/W
	per Diode				0.40	
Mounting torque	to terminal M5	F	2.5		5.0	Nm
	to heatsink M6		3.0		5.0	
Weight		W			150	g

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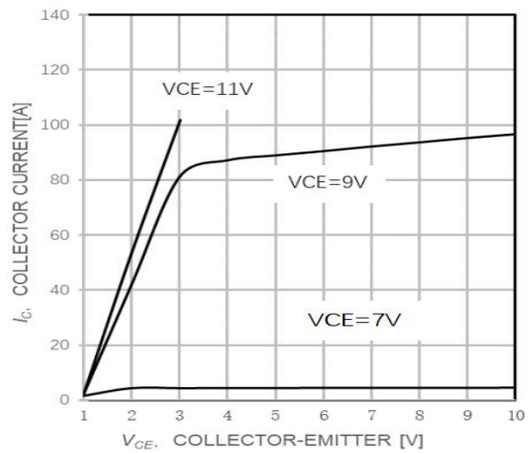
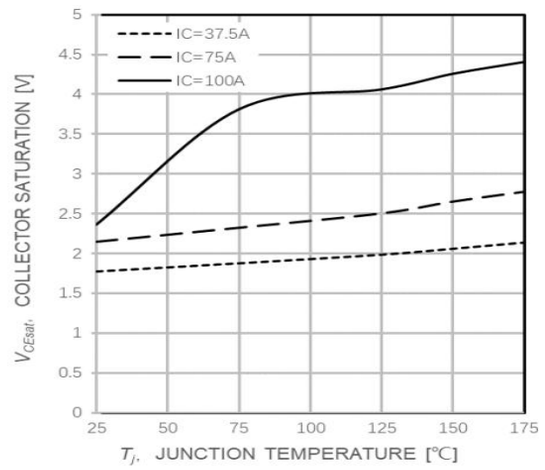
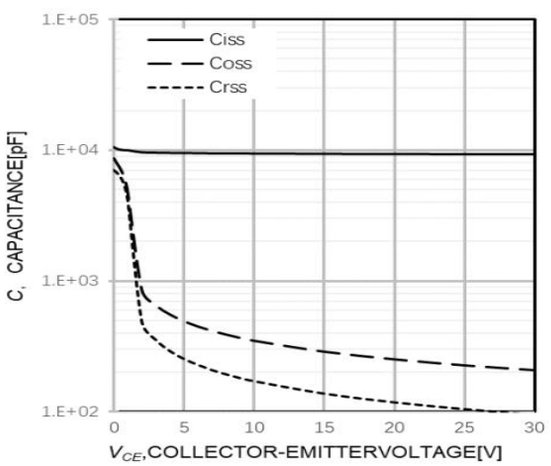
Characteristic Curves



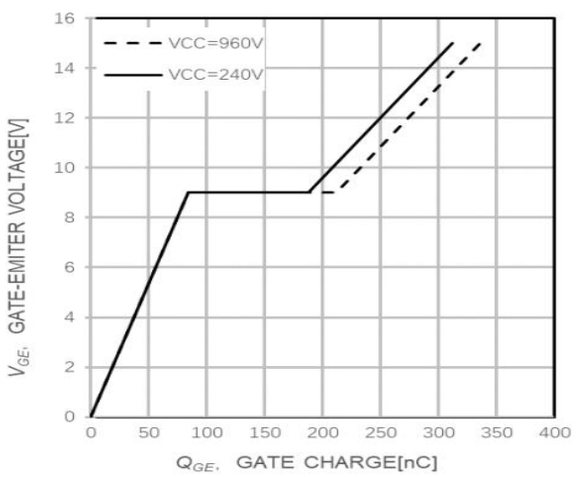
Typical output characteristic（ T_j=25℃）



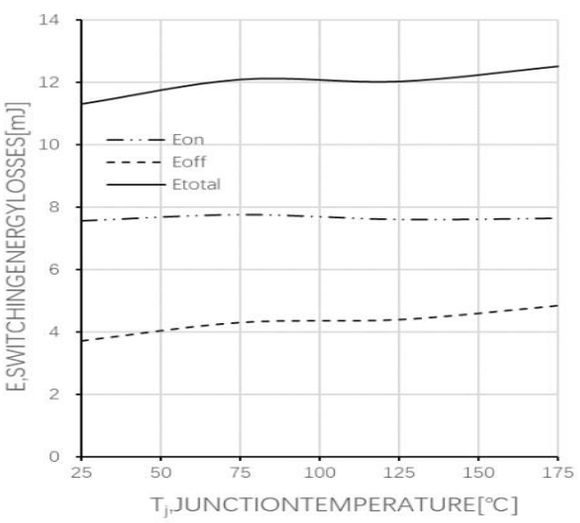
Typical collector-emitter saturation voltage as a function of junction temperature (V_{GE}=15V)



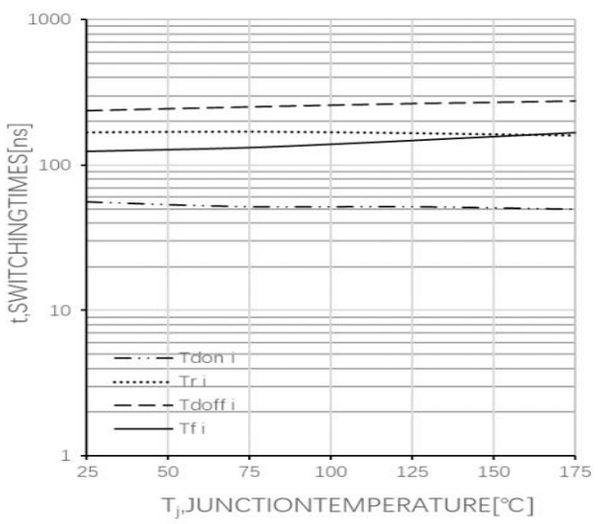
Typical capacitance as a function of collector-emitter voltage



Typical gate charge



Typical switching energy losses as a function of junction temperature



Typical switching times as a function of junction temperature

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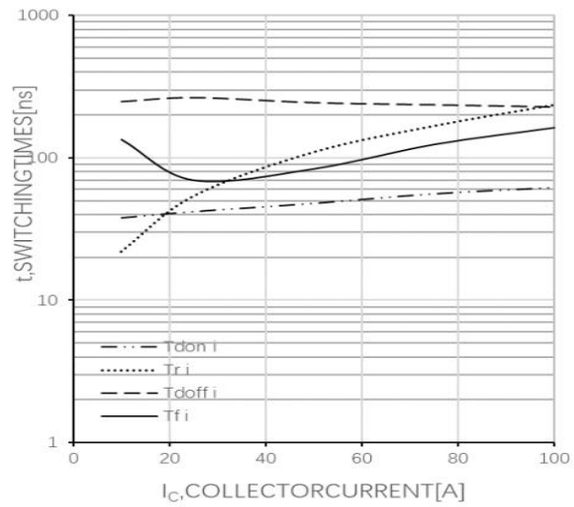
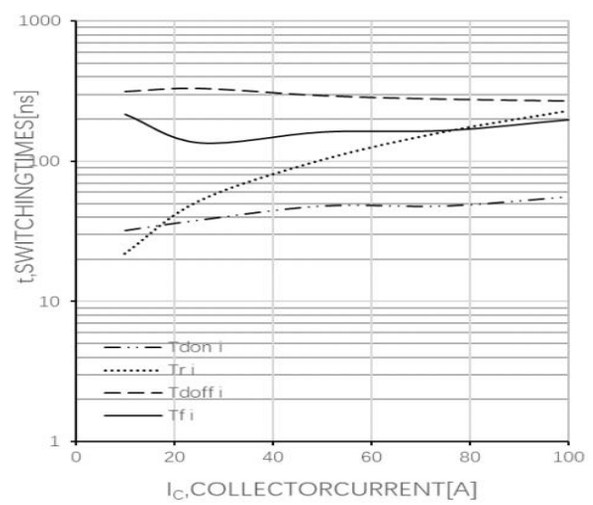
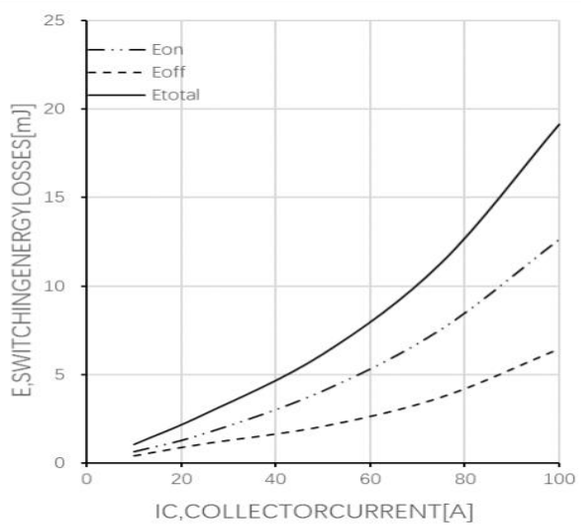


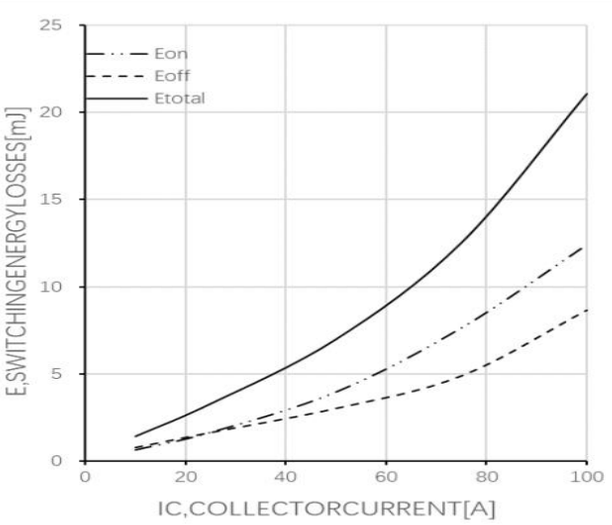
Typical switching times as a function of collector current (T_j=25°C, V_{CE}=600V, V_{GE}=0/15V,R_G=6Ω)



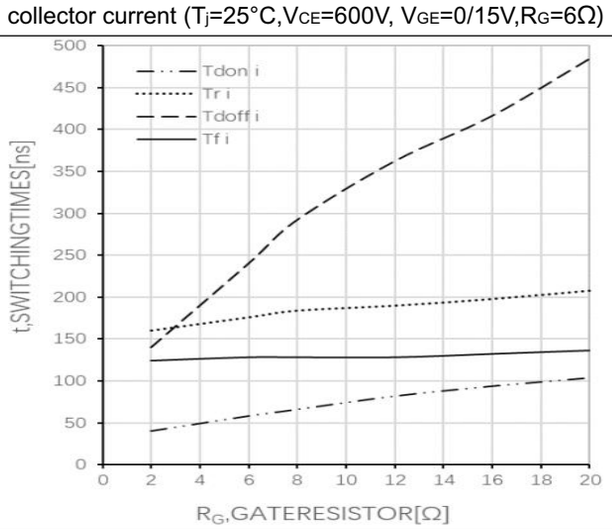
Typical switching times as a function of collector current (T_j=175°C, V_{CE}=600V, V_{GE}=0/15V, R_G=6Ω)



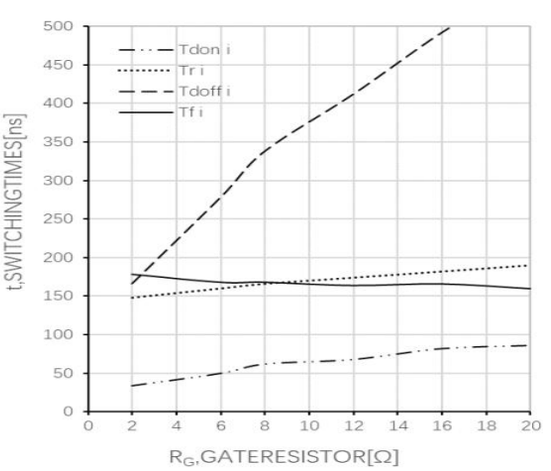
Typical switching energy losses asa function of collector current (T_j=25°C,V_{CE}=600V, V_{GE}=0/15V,R_G=6Ω)



Typical switching energy losses as a function of collector current (T_j=175°C,V_{CE}=600V, V_{GE}=0/15V,R_G=6Ω)



Typical switching times as a function of gateresistor (T_j=25°C, V_{CE}=600V, V_{GE}=0/15V,I_C=75A)



Typical switching times as a function of gateresistor (T_j=175°C, V_{CE}=600V, V_{GE}=0/15V,I_C=75A)

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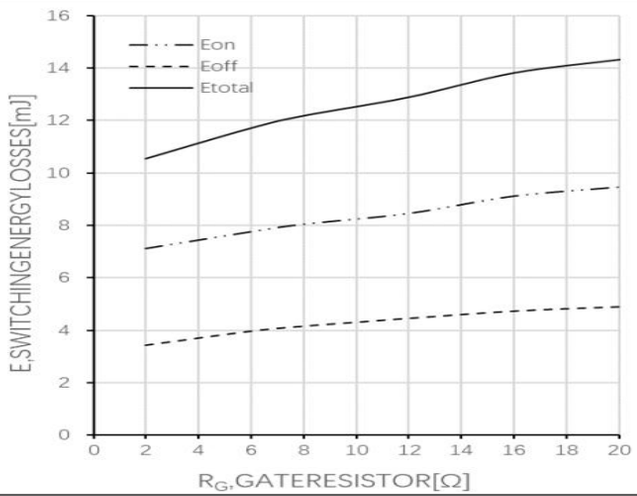
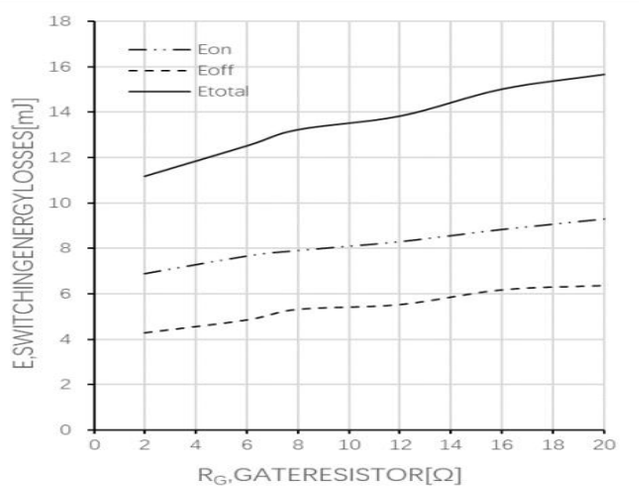
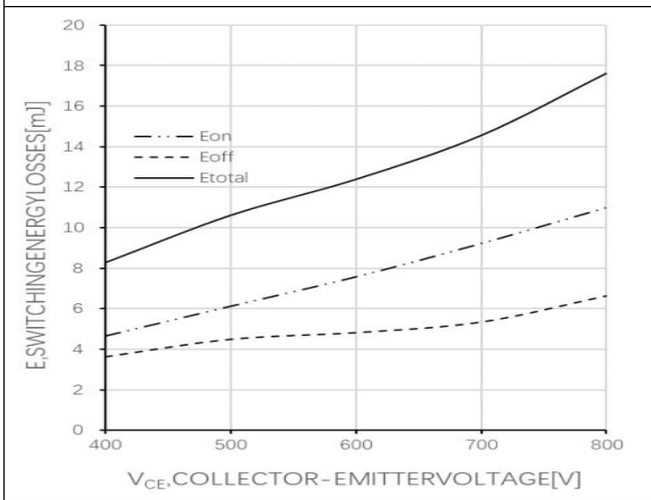


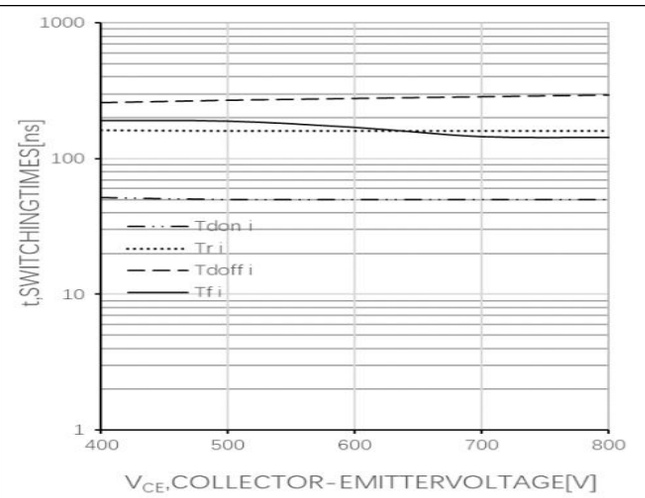
Typical switching energy losses as a function of gateresistor (T_j=25°C, V_{CE}=600V, V_{GE}=0/15V,I_C=75A)



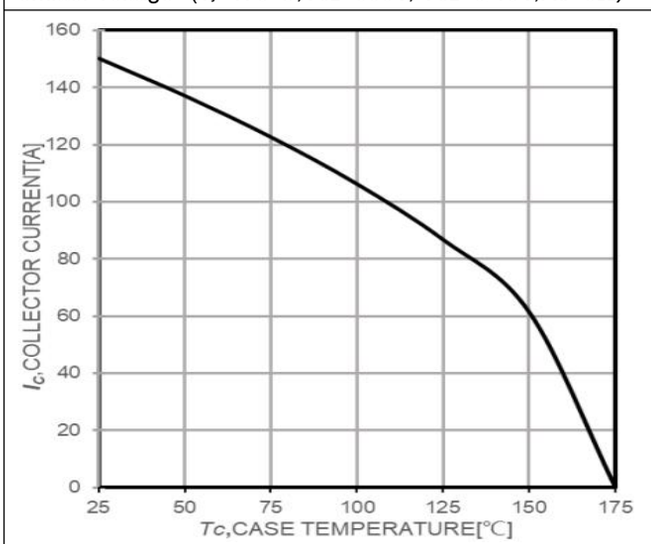
Typical switching energy losses as a function of gateresistor (T_j=175°C, V_{CE}=600V, V_{GE}=0/15V,I_C=75A)



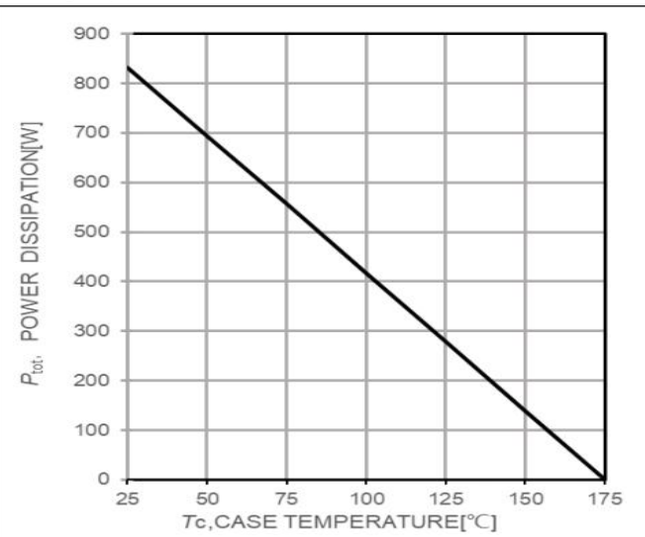
Typical switching energy losses as a function of collector emitter voltage (T_j=175°C,V_{CE}=600V, V_{GE}=0/15V,R_G=6Ω)



Typical switching times as a function of collector emitter voltage (T_j=175°C,V_{CE}=600V, V_{GE}=0/15V,R_G=6Ω)



Collector current as a function of case temperature (V_{GE}=15V)



Power dissipation temperature characteristic

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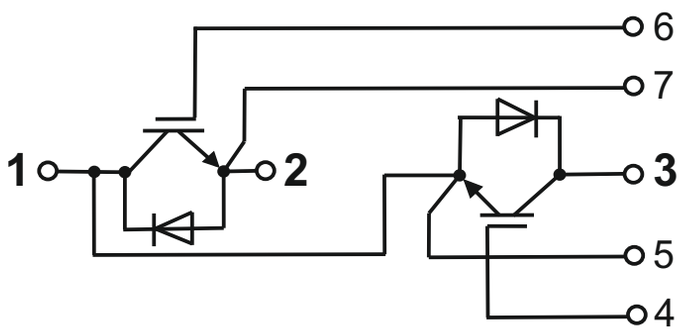
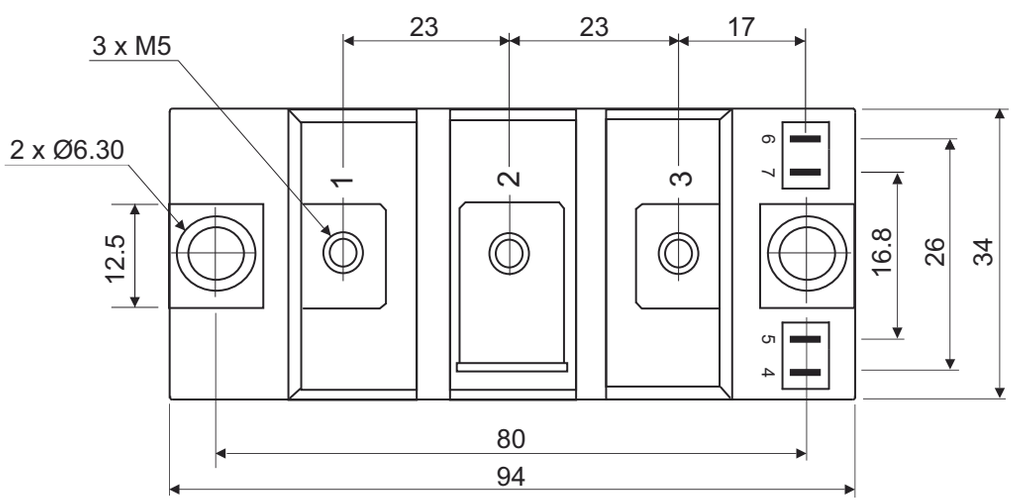
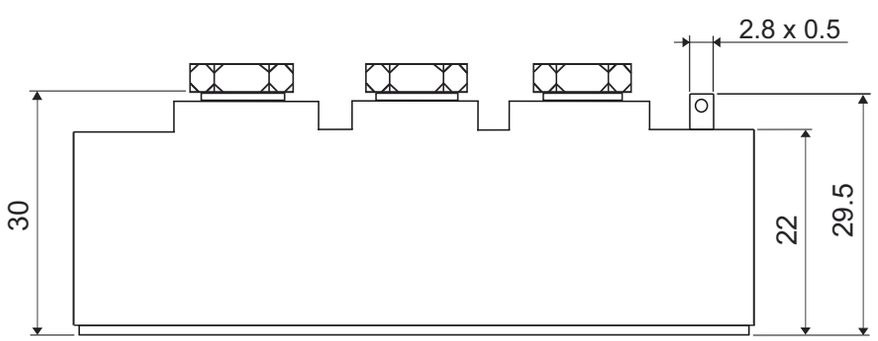
Circuit Schematic



Package Outline

(All dimensions in mm)





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