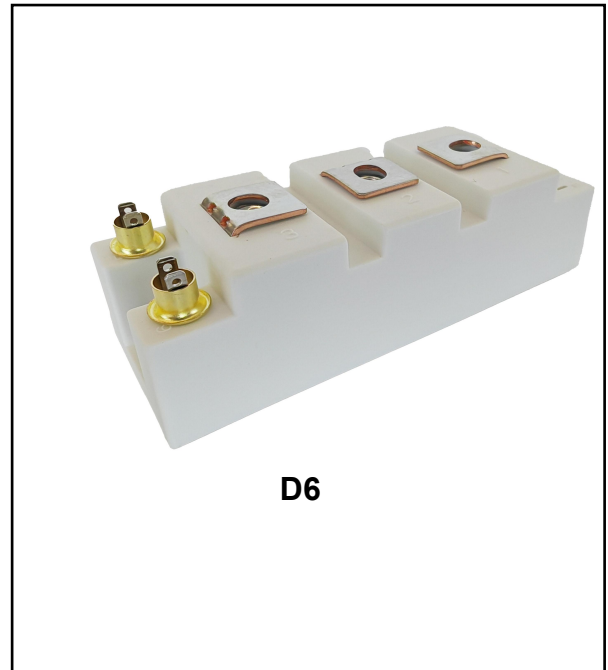


D6 module with IGBT and emitter controlled diode

Features

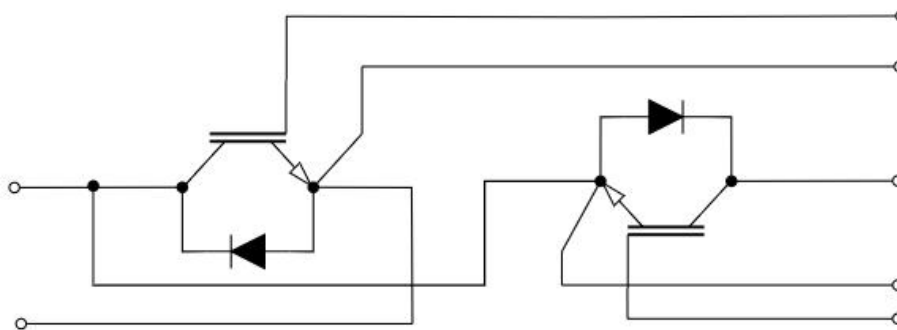
- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 50\text{ A} / I_{CRM} = 100\text{ A}$
 - V_{CESat} with positive temperature coefficient
- Mechanical features
 - Standard housing
 - 2.5 kV AC 1 min insulation
 - High creepage and clearance distances
 - Isolated base plate



Typical Applications

- Inverters
- Servo
- UPS (Uninterruptible Power Supplies)
- Welding

Description



Package Insulation coordination

Symbol	Parameter	Note or test condition	Values	Unit
V_{ISOL}	Isolation test voltage	RMS, f=50Hz, t=60s	2.5	kV
d_{creep}	Creepage distance	terminal to heatsink	17.0	mm
d_{creep}	Creepage distance	terminal to terminal	20.0	mm
d_{clear}	Clearance	terminal to heatsink	17.0	mm
d_{clear}	Clearance	terminal to terminal	9.5	mm
CTI	Comparative tracking index (electrical)		≥ 175	

Package Characteristic values

Symbol	Description	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
L_{sCE}	Stray Inductance			--	30	--	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	$T_C=25^{\circ}\text{C}$, per switch		--	0.75	--	m Ω
T_{stg}	Storage temperature			-40	--	125	$^{\circ}\text{C}$
M	Mounting torque for module mounting	-Mounting according to valid application note	M5, Screw	2.5	--	5.0	Nm
M	Terminal connection torque	-Mounting according to valid application note	M6, Screw	3.0	--	5.0	Nm
G	Weight			--	150	--	g

IGBT

Absolute Maximum Ratings (T_c = 25°C unless otherwise noted)

Symbol	Description	Note or test condition	Value	Unit
V _{CES}	Collector-Emitter Voltage	T _{vj} = 25 °C	1200	V
I _{CDC}	Continuous Collector Current @ T _c = 80°C (T _{JMAX} = 175°C)		50	A
I _{CRM}	Repetitive peak collector current	Peak Collector Current@ tp=1ms	100	A
P _{tot}	Total power dissipation	T _c = 25°C, T _{vj max} = 150°C	206	W
V _{GES}	Gate-emitter peak voltage		±30	V

Characteristics (T_c = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition		Rating			Unit
				Min	Typ	Max	
V _{CE(sat)}	Collector-Emitter Saturation Voltage	I _C =50A V _{GE} =15V	T _j =25°C	--	2.0	2.8	V
			T _j =150°C	--	2.4	--	
V _{GE(TH)}	Gate-Emitter Threshold Voltage	I _C =1mA, V _{CE} =V _{GE} , T _{vj} = 25°C		4.5	--	6.5	V
I _{CES}	Collector-Emitter Cutoff Current	V _{GE} =0V, V _{CE} =1200V, T _{vj} = 25°C		--	--	600	uA
I _{GES}	Gate-Emitter Leakage Current	V _{GE} = ±20V , V _{CE} = 0 V , T _{vj} = 25°C		--	--	100	nA
R _{Gint}	Internal Gate Resistance	T _{vj} = 25 °C		--	0.8	--	Ω
C _{ies}	Input Capacitance	V _{CE} =30V, V _{GE} =0V, f=1MHz, T _{vj} = 25°C		--	8789	--	pF
C _{oes}	Output Capacitance			--	214	--	
C _{res}	Reverse Transfer Capacitance			--	161	--	
Q _g	Total Gate Charge	V _{CC} =960V, I _C =50A, V _{GE} =15V, T _{vj} = 25°C		--	294	--	nC
Q _{ge}	Gate to Emitter Charge			--	61	--	
Q _{gc}	Gate to Collector Charge			--	127	--	
t _{d(ON)}	Turn-on Delay Time	V _{CE} =600V, I _C =50A, V _{GE} =15/-5V, R _g =7.8Ω Inductive Load		--	48	--	ns
t _r	Rise Time			--	32	--	
t _{d(OFF)}	Turn-Off Delay Time			--	168	--	
t _f	Fall Time			--	72	--	
E _{on}	Turn-On Switching Loss			--	2.2	--	mJ
E _{off}	Turn-Off Switching Loss			--	1.4	--	
E _{ts}	Total Switching Loss			--	3.6	--	

R_{thJC}	Thermal resistance, junction to case	per IGBT	--	0.54	--	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40	--	150 ¹⁾	°C

¹⁾ $T_{vj\ op} > 150^{\circ}\text{C}$ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Diode

Absolute Maximum Ratings ($T_c = 25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Description	Note or test condition	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	1200	V
I_F	Continuous DC forward current		50	A
I_{FRM}	Repetitive peak forward current	$t_p = 1\ \text{ms}$	100	A

Characteristics ($T_c = 25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V_F	Diode Forward Voltage	$I_F = 50\text{A}$	--	3.3	4.2	V
T_{rr}	Reverse Recovery Time	$V_{CE} = 600\text{V}, I_F = 50\text{A},$ $V_{GE} = 15/-5\text{V}$ $R_g = 7.8\Omega$	--	140	--	ns
I_{RRM}	Diode Peak Reverse Recovery Current		--	16	--	A
Q_{rr}	Reverse Recovery Charge		--	1.3	--	µC
E_{rec}	Reverse Recovery Energy		--	0.6	--	mJ
R_{thJC}	Thermal resistance, junction to case	per Diode	--	0.924	--	K/W
$T_{vj\ op}$	Temperature under switching conditions		-40	--	150 ²⁾	°C

²⁾ $T_{vj\ op} > 150^{\circ}\text{C}$ is only allowed for operation at overload conditions. For detailed specifications please refer to AN 2018-14.

Typical Electrical and Thermal Characteristics

Figure 1 Output Characteristics

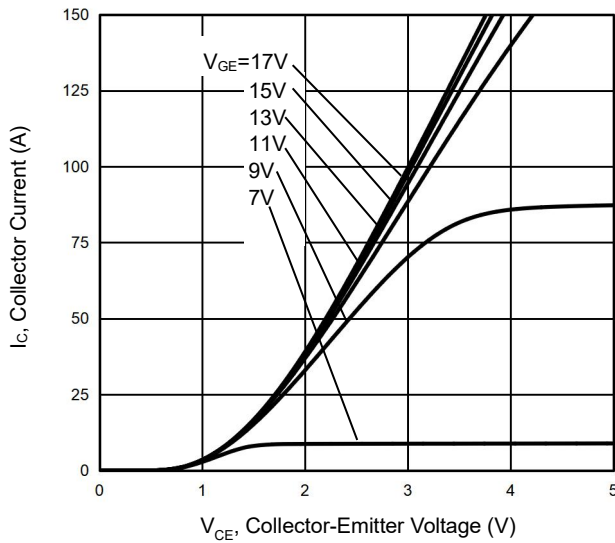


Figure 2 Transfer Characteristics

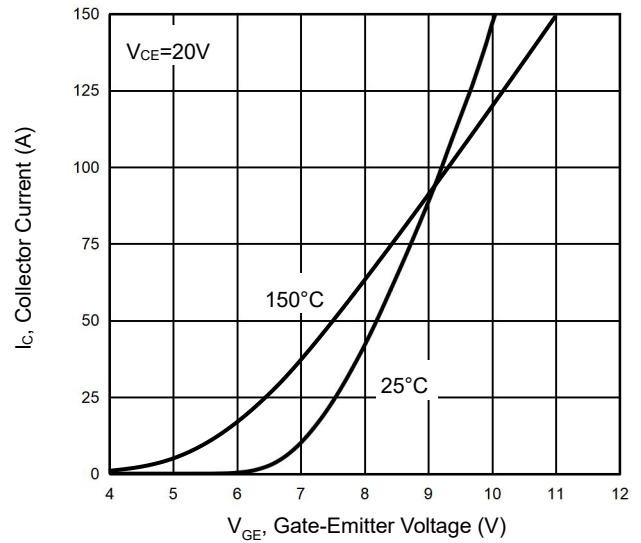


Figure 3 $V_{CE(sat)}$ vs. Case Temperature

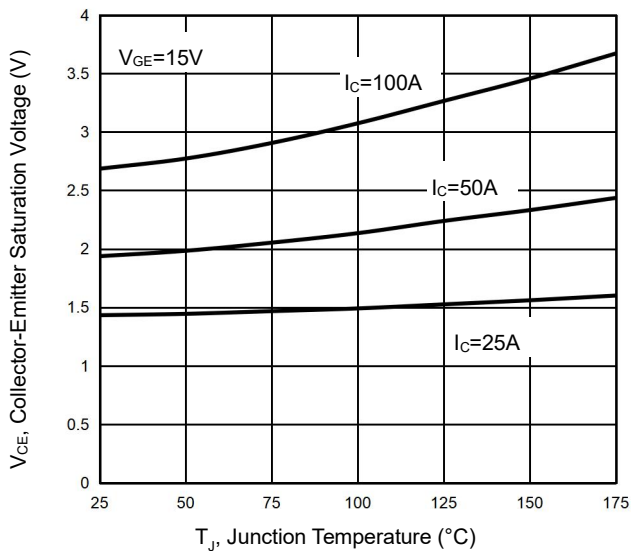


Figure 4 Saturation Voltage vs. V_{GE}

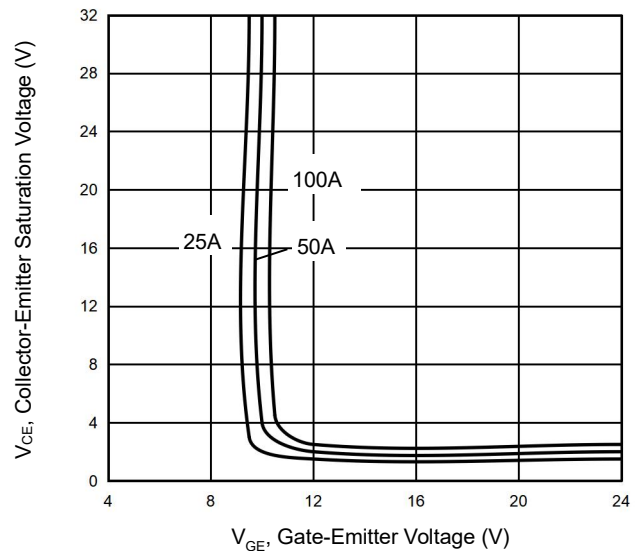


Figure 5 Capacitance Characteristics

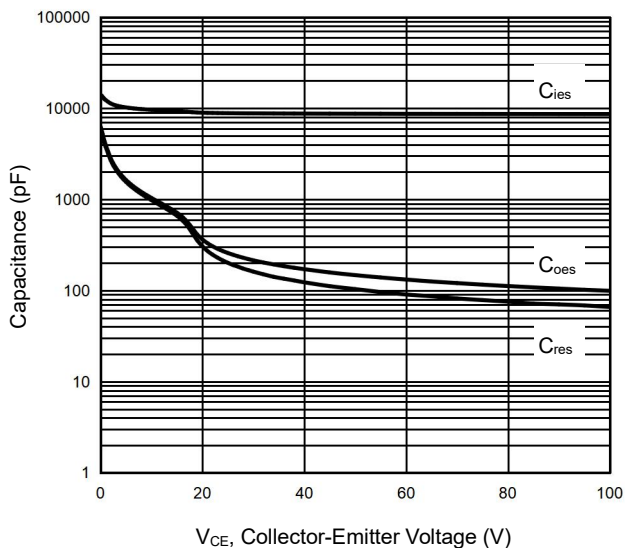
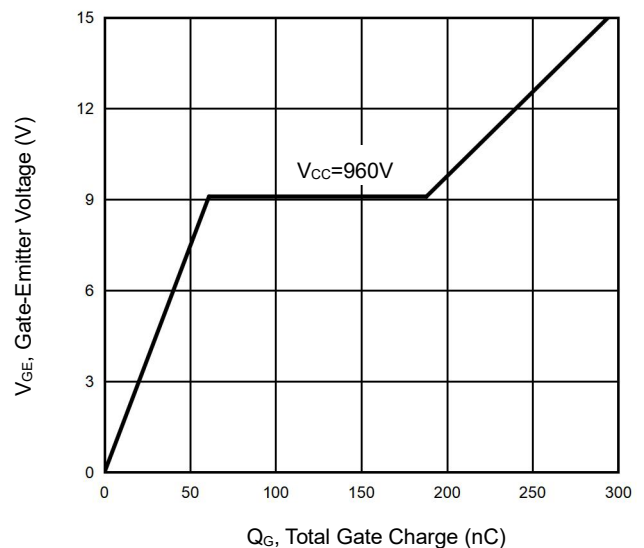


Figure 6 Gate Charge Wave Form



Typical Electrical and Thermal Characteristic

Figure 7 Forward Characteristics

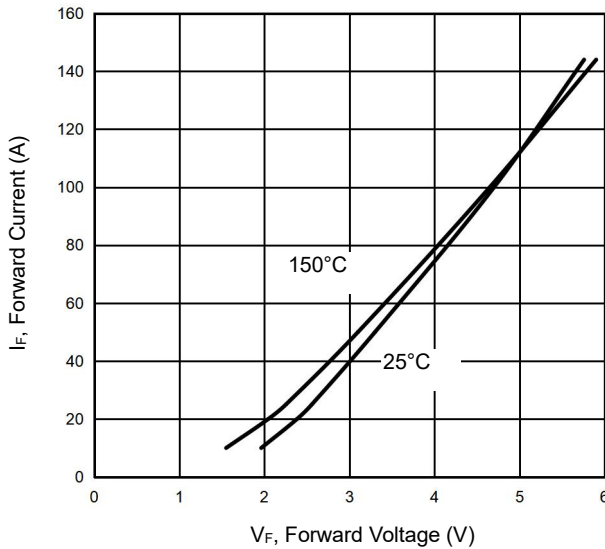


Figure 8 V_F vs. Temperature

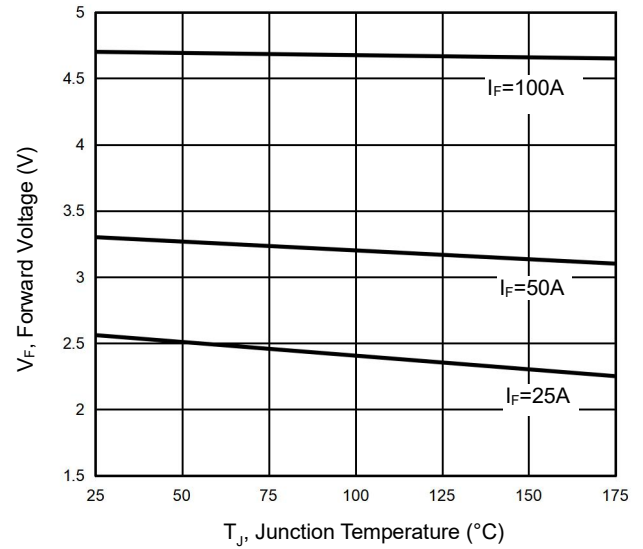


Figure 9 Switching Energy vs. Temperature

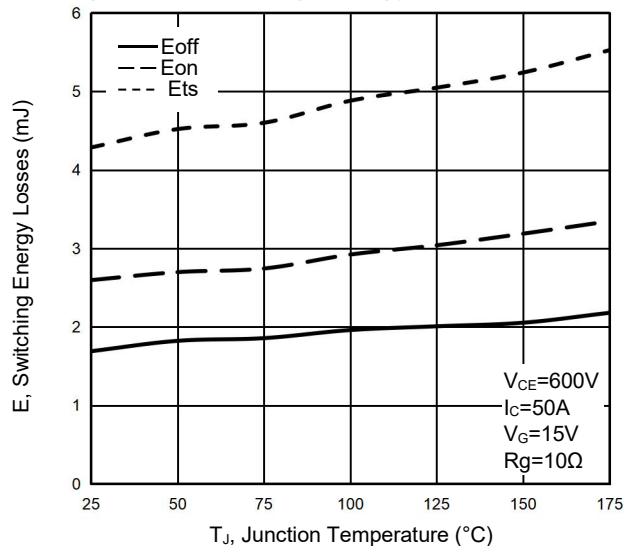


Figure 10 Forward Bias Safe Operating Area

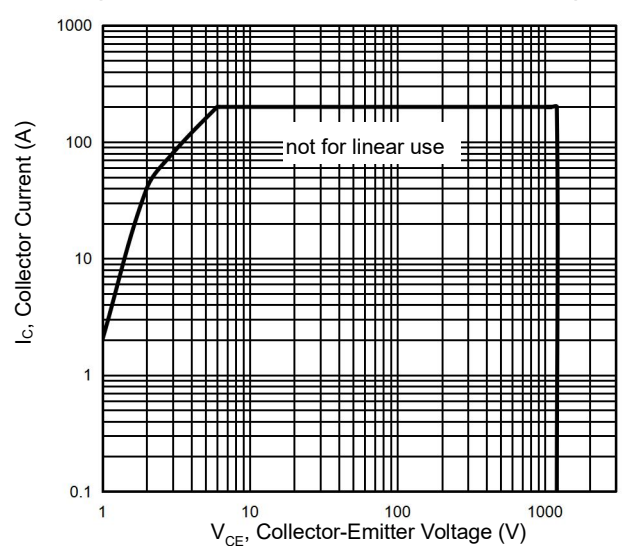


Figure 11 Gate-Emitter Threshold Voltage as a Function of Junction Temperature

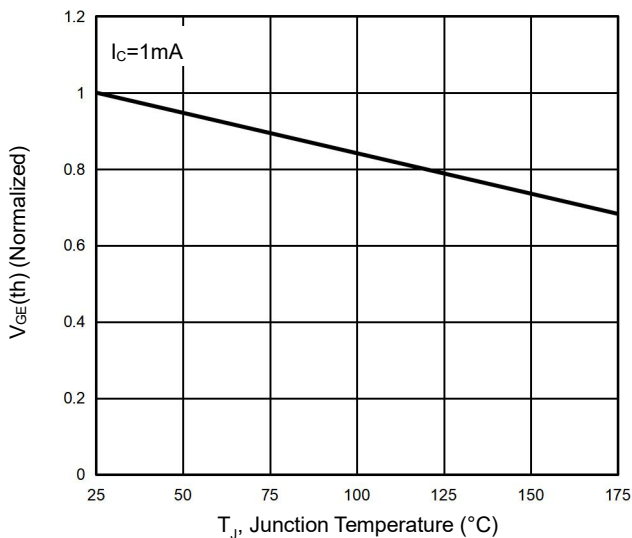
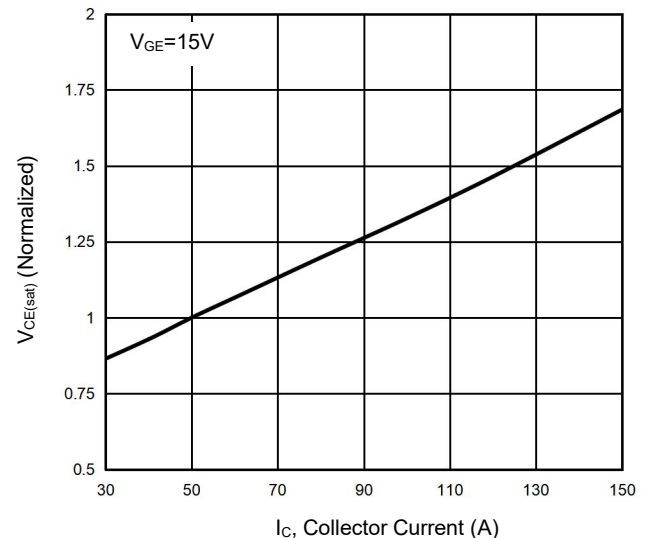


Figure 12 Typical Collector-Emitter Saturation Voltage as a function of Collector Current



Typical Electrical and Thermal Characteristics

Figure 13 Switching Loss vs. R_G

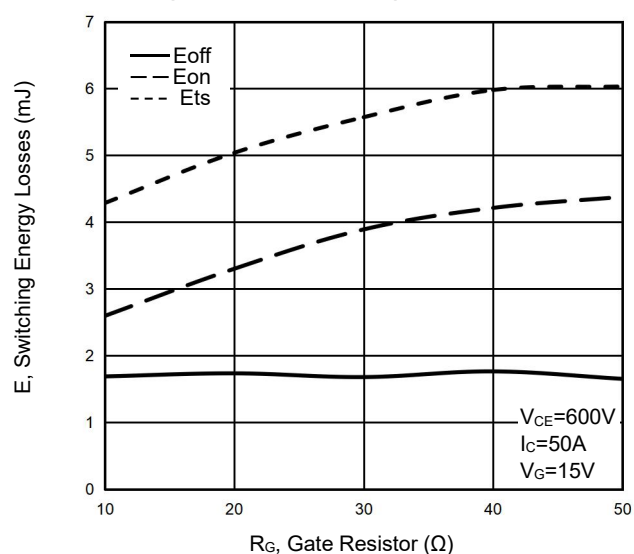


Figure 14 Switching Loss vs. Collector Current

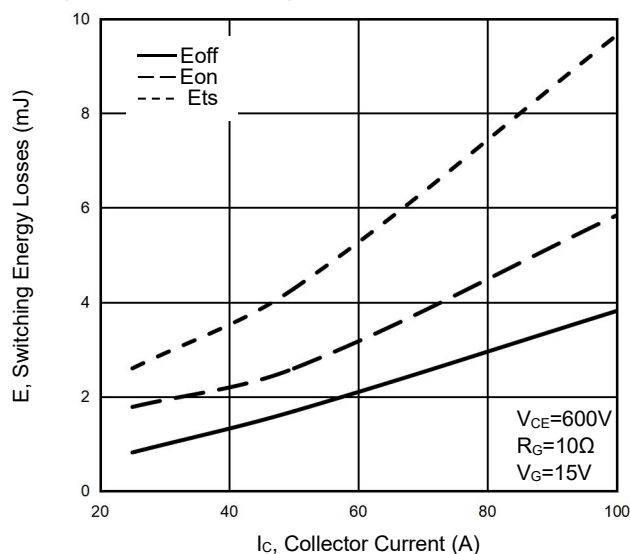


Figure 15 Switching Loss vs. Collector Current

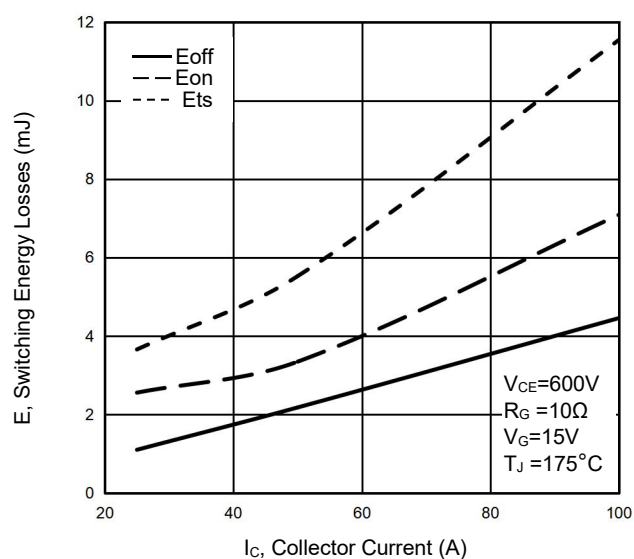


Figure 16 P_{tot} vs. Case Temperature

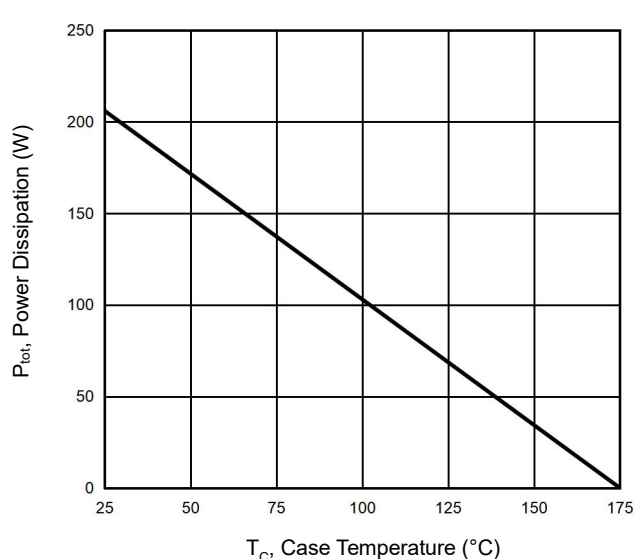


Figure 17 V_{CEs} vs. Temperature

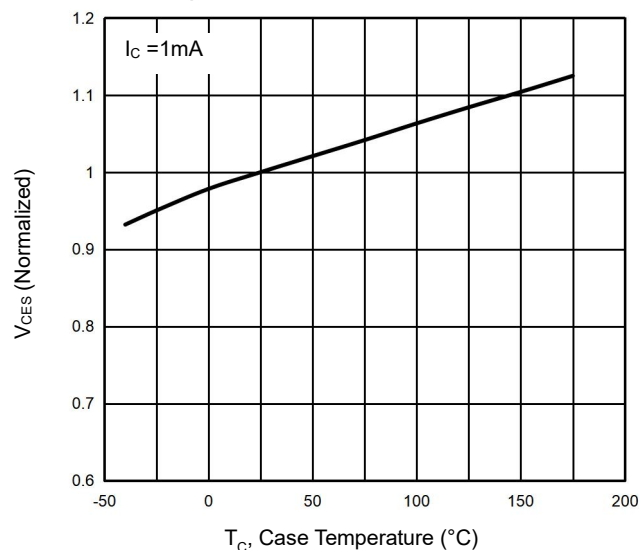
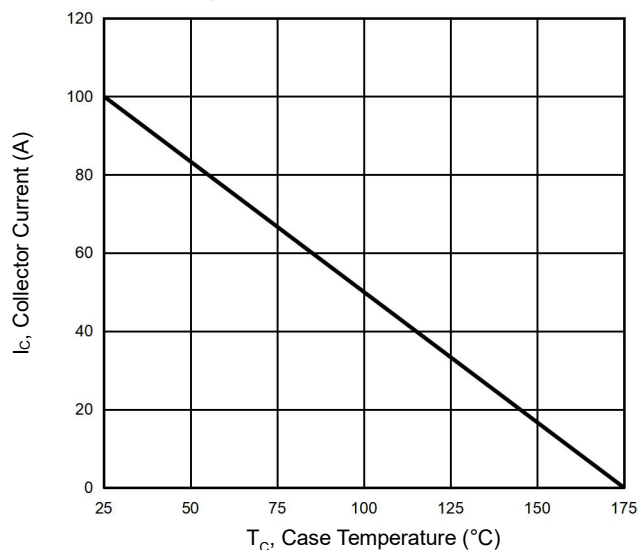
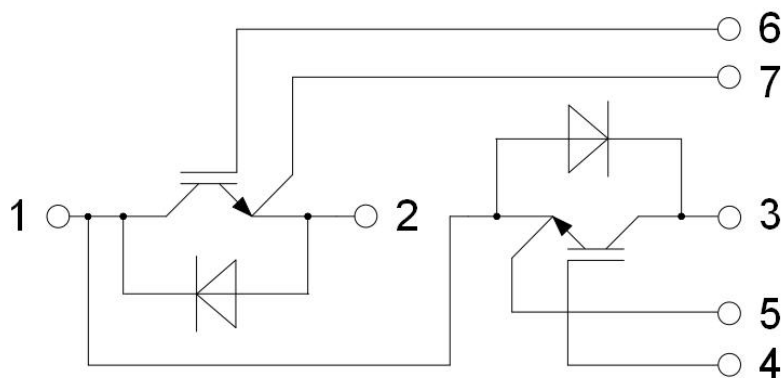


Figure 18 I_C vs. Temperature



Circuit Diagram



Package Dimensions

Dimensions in Millimeters

