

Reverse-Conducting IGBT with monolithic body diode

Features

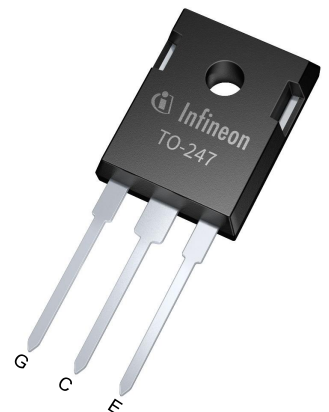
- $V_{CE} = 1100\text{ V}$
- $I_C = 30\text{ A}$
- Powerful monolithic body diode with low forward voltage designed for soft commutation only
- Very tight parameter distribution
- High ruggedness, temperature stable behavior
- Very low V_{CEsat}
- Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- Low EMI
- Pb-free lead plating; RoHS compliant
- Complete product spectrum and PSpice Models: <http://www.infineon.com/igbt/>

Potential applications

- Induction cooking
- Microwave ovens
- Rice Cookers

Product validation

- Qualified for industrial applications according to the relevant tests of JEDEC47/20/22



Lead-Free



Green

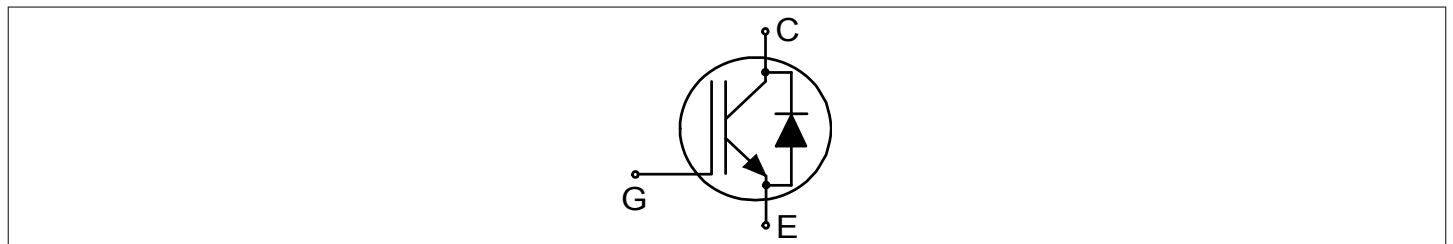


Halogen-Free



RoHS

Description



Type	Package	Marking
IHW30N110R5	PG-TO247-3-STD-NN2.5	H30KR5

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1 Package

Table 1 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Internal emitter inductance measured 5 mm (0.197 in.) from case	L_E			13.0		nH
Storage temperature	T_{stg}		-55		150	°C
Soldering temperature		wave soldering 1.6 mm (0.063 in.) from case for 10 s			260	°C
Mounting torque	M	M3 screw Maximum of mounting process: 3			0.6	Nm
Thermal resistance, junction-ambient	$R_{th(j-a)}$				40	K/W

2 IGBT

Table 2 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit	
Collector-emitter voltage	V_{CE}	$T_{vj} \geq 25\text{ °C}$	1100	V	
DC collector current, limited by T_{vjmax}	I_C		$T_c = 25\text{ °C}$	60	A
			$T_c = 100\text{ °C}$	30	
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpulse}		90	A	
Non repetitive peak collector current ¹⁾	I_{CSM}		200	A	
Turn-off safe operating area		$V_{CE} \leq 1100\text{ V}$, $t_p \leq 1\text{ }\mu\text{s}$, $T_{vj} \leq 175\text{ °C}$	90	A	
Gate-emitter voltage	V_{GE}		-20/25	V	
Transient gate-emitter voltage	V_{GE}	$t_p \leq 10\text{ }\mu\text{s}$, $D < 0.01$	30	V	
Power dissipation	P_{tot}		$T_c = 25\text{ °C}$	330	W
			$T_c = 100\text{ °C}$	165	

1) capacitor charging saturation current limited by $T_{vjmax} < 175\text{ °C}$ and $t_p < 3\text{ }\mu\text{s}$

Table 3 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Collector-emitter breakdown voltage	V_{BRCES}	$I_C = 0.5\text{ mA}$, $V_{GE} = 0\text{ V}$	1100			V

(table continues...)

Table 3 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Collector-emitter saturation voltage	V_{CEsat}	$I_C = 30\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$		1.55	1.85	V
			$T_{vj} = 125\text{ °C}$		1.8		
			$T_{vj} = 175\text{ °C}$		1.9		
Gate-emitter threshold voltage	V_{GETh}	$I_C = 0.75\text{ mA}, V_{CE} = V_{GE}$		5.1	5.8	6.4	V
Zero gate-voltage collector current	I_{CES}	$V_{CE} = 1100\text{ V}, V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$			100	μA
			$T_{vj} = 175\text{ °C}$		630		
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}$				100	nA
Transconductance	g_{fs}	$I_C = 30\text{ A}, V_{CE} = 20\text{ V}$			23		S
Input capacitance	C_{ies}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 100\text{ kHz}$			1800		pF
Output capacitance	C_{oes}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 100\text{ kHz}$			55		pF
Reverse transfer capacitance	C_{res}	$V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}, f = 100\text{ kHz}$			45		pF
Gate charge	Q_G	$I_C = 30\text{ A}, V_{GE} = 15\text{ V}, V_{CC} = 880\text{ V}$			240		nC
Turn-off delay time	$t_{d(off)}$	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{Gon} = 10\ \Omega, R_{Goff} = 10\ \Omega, L_\sigma = 175\text{ nH}, C_\sigma = 40\text{ pF}$	$T_{vj} = 25\text{ °C}, I_C = 30\text{ A}$		350		ns
			$T_{vj} = 175\text{ °C}, I_C = 30\text{ A}$		420		
Fall time (inductive load)	t_f	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{Gon} = 10\ \Omega, R_{Goff} = 10\ \Omega, L_\sigma = 175\text{ nH}, C_\sigma = 40\text{ pF}$	$T_{vj} = 25\text{ °C}, I_C = 30\text{ A}$		30		ns
			$T_{vj} = 175\text{ °C}, I_C = 30\text{ A}$		90		
Turn-off energy	E_{off}	$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_{Gon} = 10\ \Omega, R_{Goff} = 10\ \Omega, L_\sigma = 175\text{ nH}, C_\sigma = 40\text{ pF}$	$T_{vj} = 25\text{ °C}, I_C = 30\text{ A}$		1.2		mJ
			$T_{vj} = 175\text{ °C}, I_C = 30\text{ A}$		2.4		
Soft turn-off energy	E_{off}	$V_{CC} = 600\text{ V}, R_{Gon} = 10\ \Omega, R_{Goff} = 10\ \Omega, L_\sigma = 175\text{ nH}, C_\sigma = 40\text{ pF}$	$T_{vj} = 25\text{ °C}, I_C = 30\text{ A}$		0.14		mJ
			$T_{vj} = 175\text{ °C}, I_C = 30\text{ A}$		0.376		
IGBT thermal resistance, junction to case	$R_{th(j-c)}$					0.45	K/W
Operating junction temperature	T_{vj}			-40		175	$^{\circ}\text{C}$

Note: Electrical Characteristic, at $T_{vj} = 25\text{ °C}$, unless otherwise specified.

3 Diode

Table 4 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} \geq 25\text{ °C}$	1100	V	
Diode forward current, limited by T_{vjmax}	I_F		$T_c = 25\text{ °C}$	60	A
			$T_c = 100\text{ °C}$	30	
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpulse}		90	A	

Table 5 Characteristic values

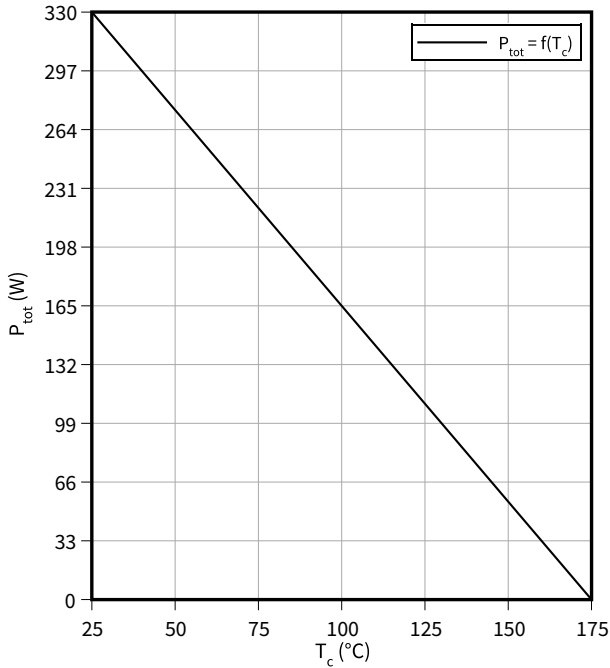
Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Diode forward voltage	V_F	$I_F = 30\text{ A}$	$T_{vj} = 25\text{ °C}$	1.8	2	V
			$T_{vj} = 125\text{ °C}$	2		
			$T_{vj} = 175\text{ °C}$	2.1		
Reverse leakage current	I_R	$V_R = 1100\text{ V}$	$T_{vj} = 25\text{ °C}$		100	μA
			$T_{vj} = 175\text{ °C}$		630	
Diode thermal resistance, junction to case	$R_{th(j-c)}$				0.45	K/W
Operating junction temperature	T_{vj}		-40		175	$^{\circ}\text{C}$

Note: For optimum lifetime and reliability, Infineon recommends operating conditions that do not exceed 80% of the maximum ratings stated in this datasheet.

4 Characteristics diagrams

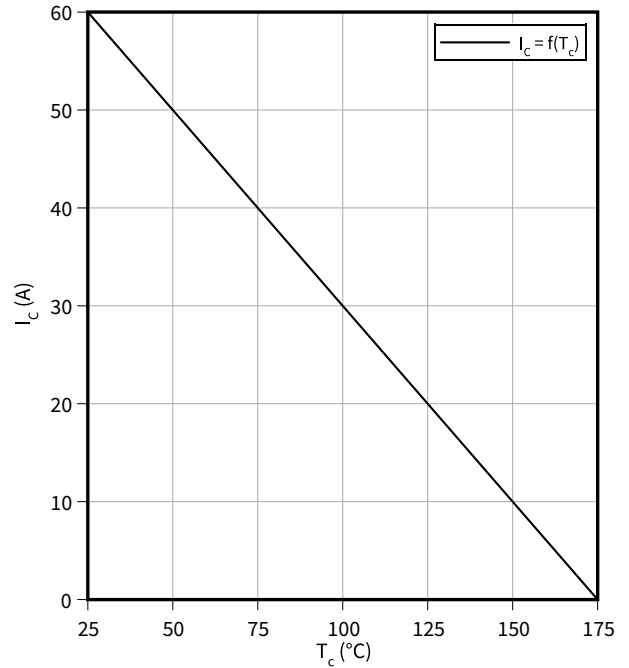
Power dissipation as a function of case temperature

$P_{tot} = f(T_c)$
 $T_{vj} \leq 175\text{ °C}$



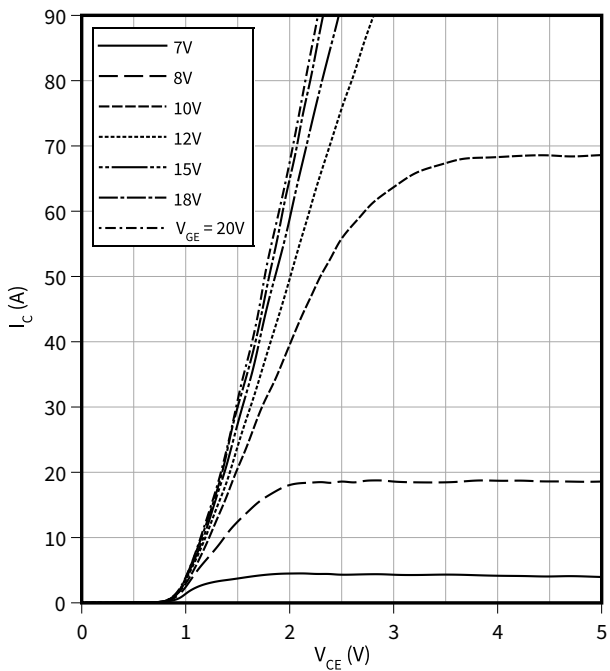
Collector current as a function of case temperature

$I_C = f(T_c)$
 $T_{vj} \leq 175\text{ °C}, V_{GE} \geq 15\text{ V}$



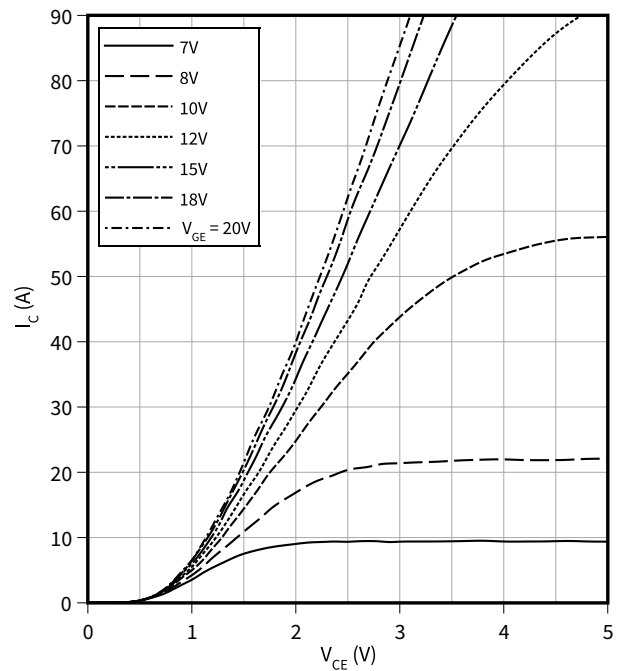
Typical output characteristic

$I_C = f(V_{CE})$
 $T_{vj} = 25\text{ °C}$



Typical output characteristic

$I_C = f(V_{CE})$
 $T_{vj} = 175\text{ °C}$

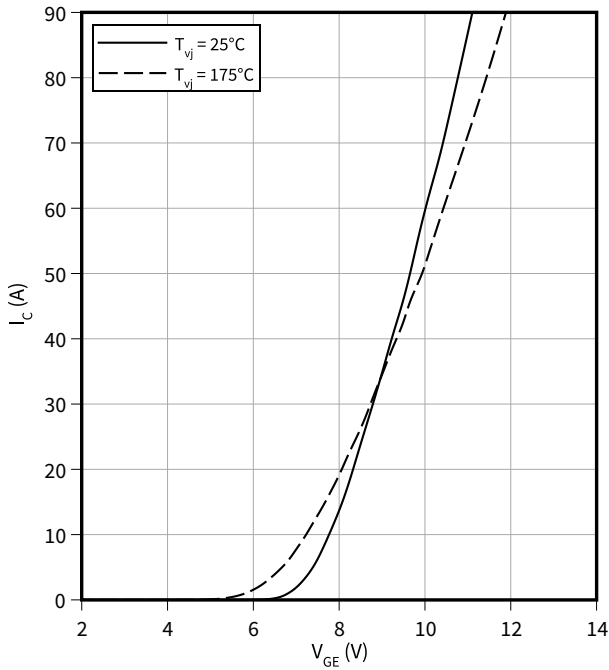


4 Characteristics diagrams

Typical transfer characteristic

$I_C = f(V_{GE})$

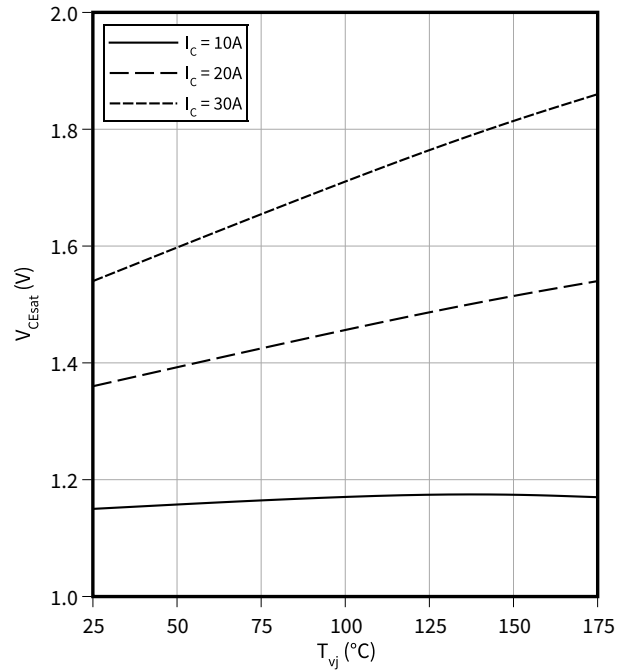
$V_{CE} = 20\text{ V}$



Typical collector-emitter saturation voltage as a function of junction temperature

$V_{CEsat} = f(T_{vj})$

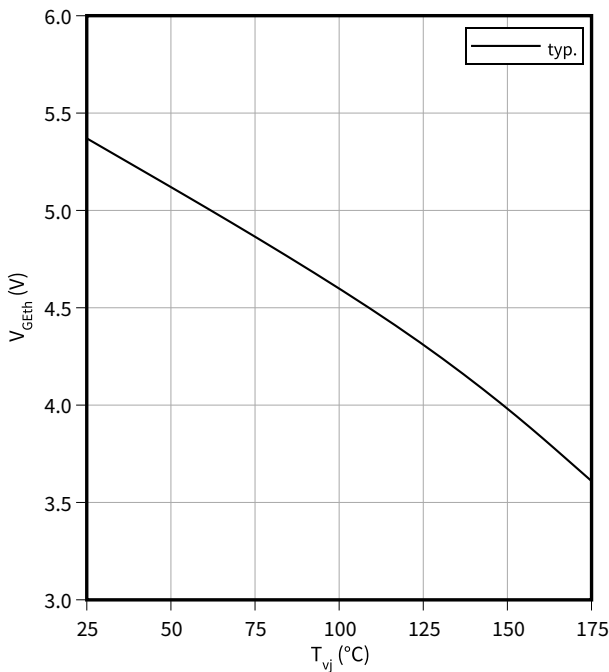
$V_{GE} = 15\text{ V}$



Gate-emitter threshold voltage as a function of junction temperature

$V_{GEth} = f(T_{vj})$

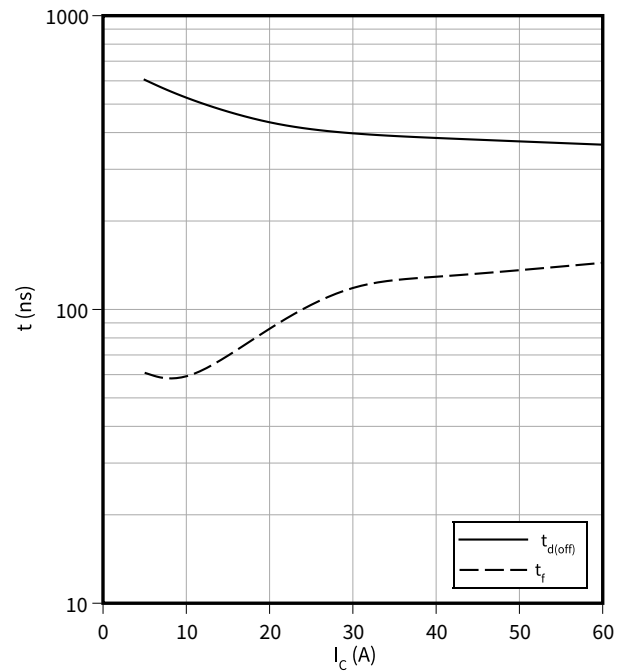
$I_C = 0.75\text{ mA}$



Typical switching times as a function of collector current

$t = f(I_C)$

$V_{CC} = 600\text{ V}, T_{vj} = 175^\circ\text{C}, V_{GE} = 0/15\text{ V}, R_G = 10\ \Omega$

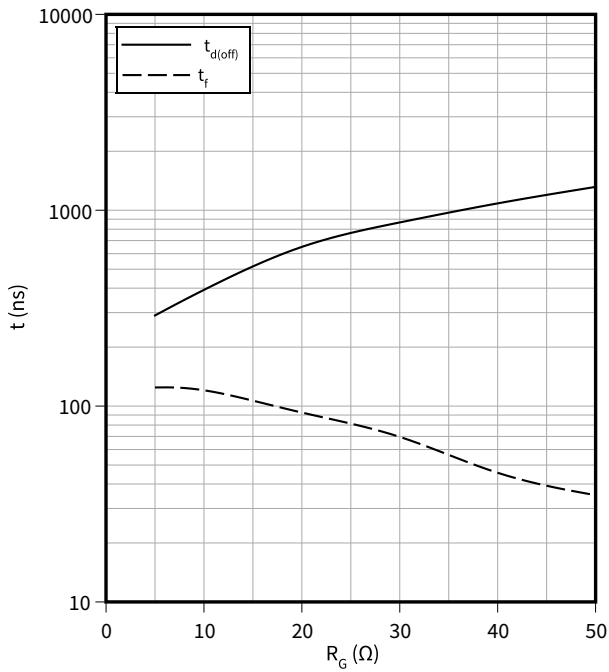


4 Characteristics diagrams

Typical switching times as a function of gate resistor

$t = f(R_G)$

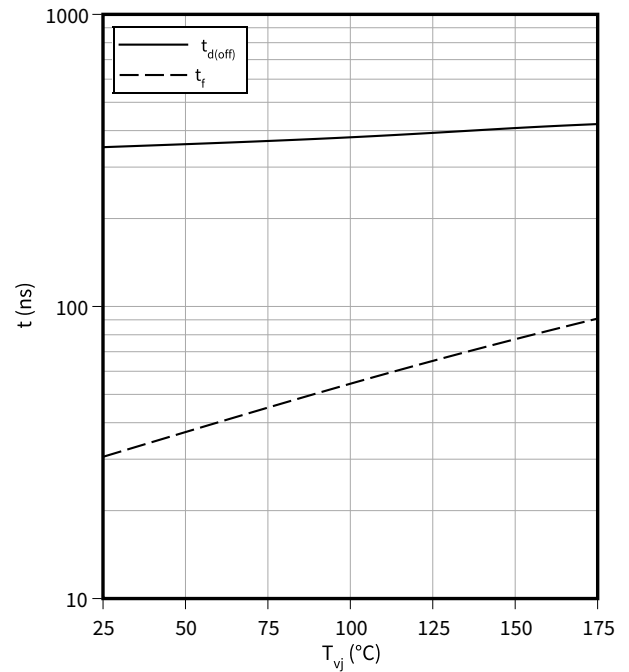
$I_C = 30\text{ A}, V_{CC} = 600\text{ V}, T_{vj} = 175\text{ }^\circ\text{C}, V_{GE} = 0/15\text{ V}$



Typical switching times as a function of junction temperature

$t = f(T_{vj})$

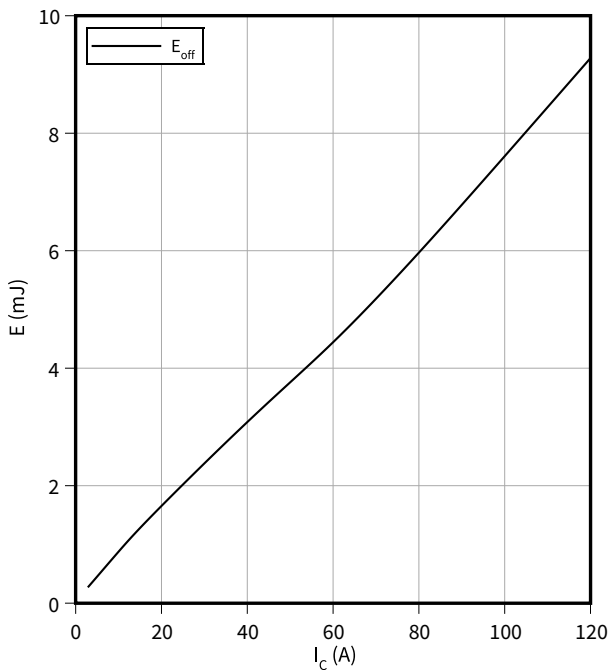
$I_C = 30\text{ A}, V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_G = 10\text{ }^\circ\Omega$



Typical switching energy losses as a function of collector current

$E = f(I_C)$

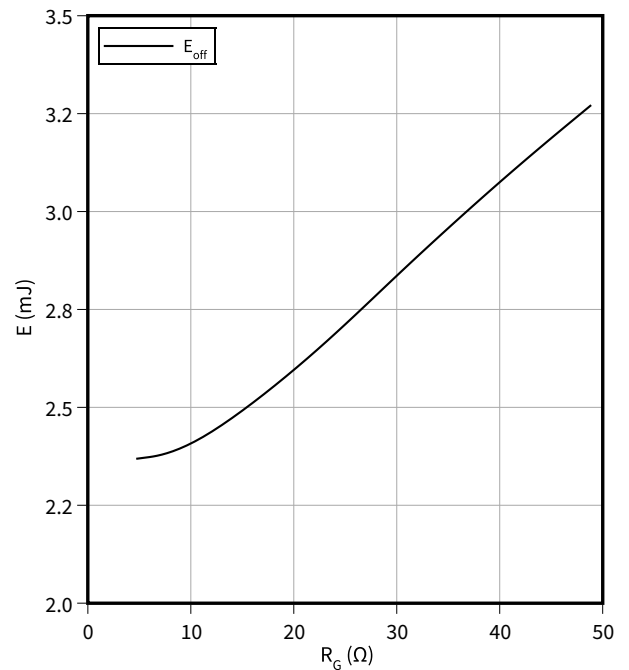
$V_{CC} = 600\text{ V}, T_{vj} = 175\text{ }^\circ\text{C}, V_{GE} = 0/15\text{ V}, R_G = 10\text{ }^\circ\Omega$



Typical switching energy losses as a function of gate resistor

$E = f(R_G)$

$I_C = 30\text{ A}, V_{CC} = 600\text{ V}, T_{vj} = 175\text{ }^\circ\text{C}, V_{GE} = 0/15\text{ V}$

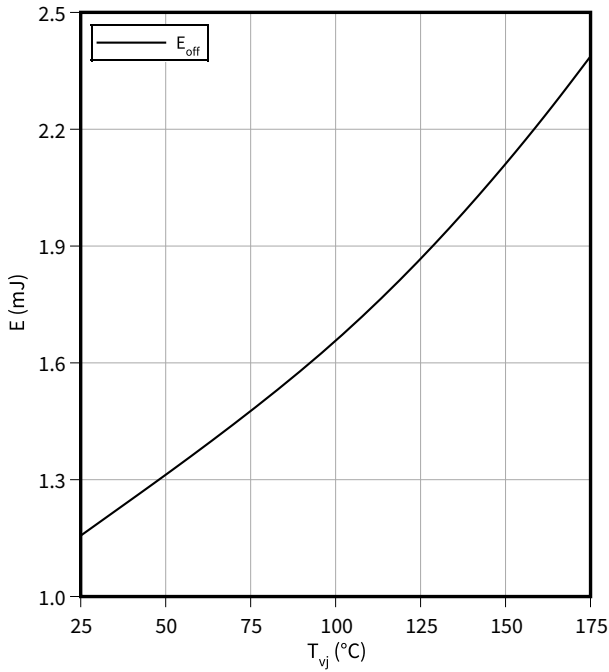


4 Characteristics diagrams

Typical switching energy losses as a function of junction temperature

$E = f(T_{vj})$

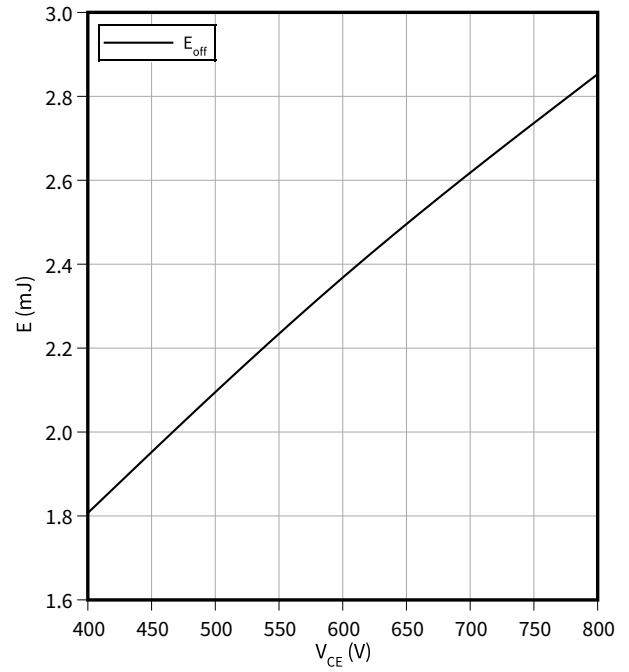
$I_C = 30\text{ A}, V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_G = 10\ \Omega$



Typical switching energy losses as a function of collector emitter voltage

$E = f(V_{CE})$

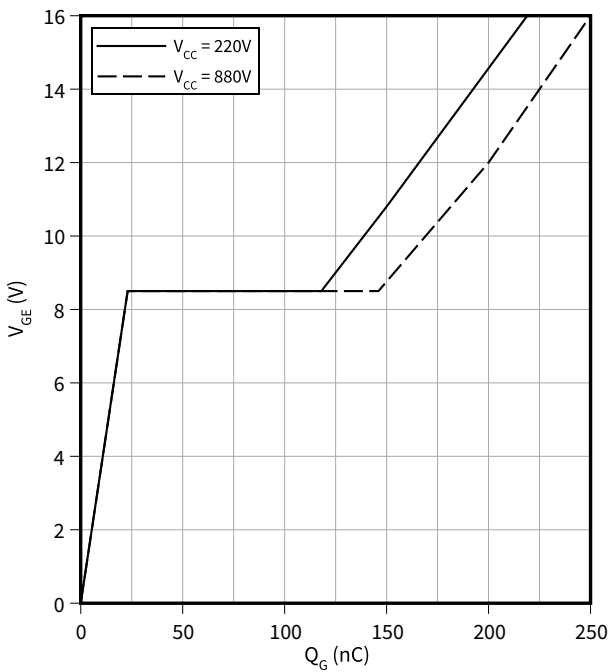
$I_C = 30\text{ A}, T_{vj} = 175\text{ °C}, V_{GE} = 0/15\text{ V}, R_G = 10\ \Omega$



Typical gate charge

$V_{GE} = f(Q_G)$

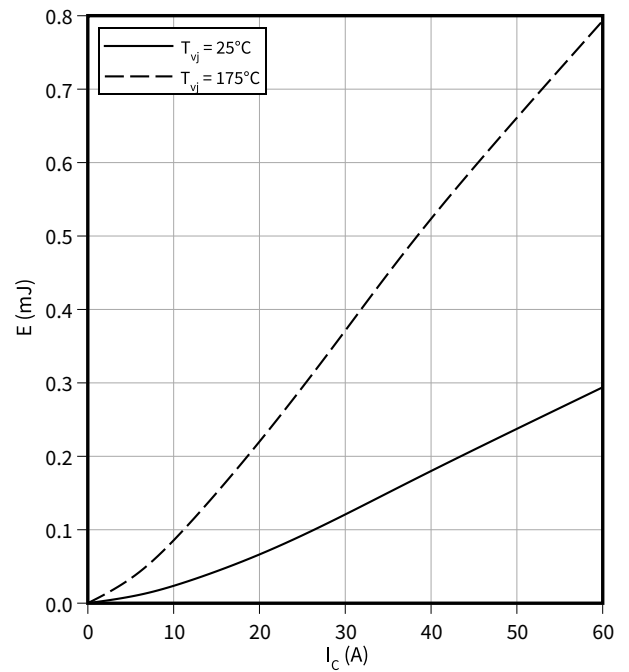
$I_C = 30\text{ A}$



Typical turn off switching energy loss for soft switching

$E = f(I_C)$

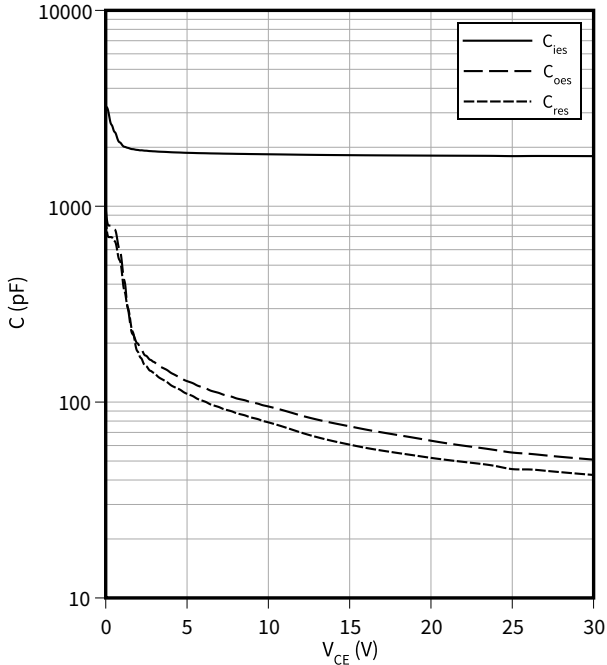
$V_{CC} = 600\text{ V}, V_{GE} = 0/15\text{ V}, R_G = 10\ \Omega$



4 Characteristics diagrams

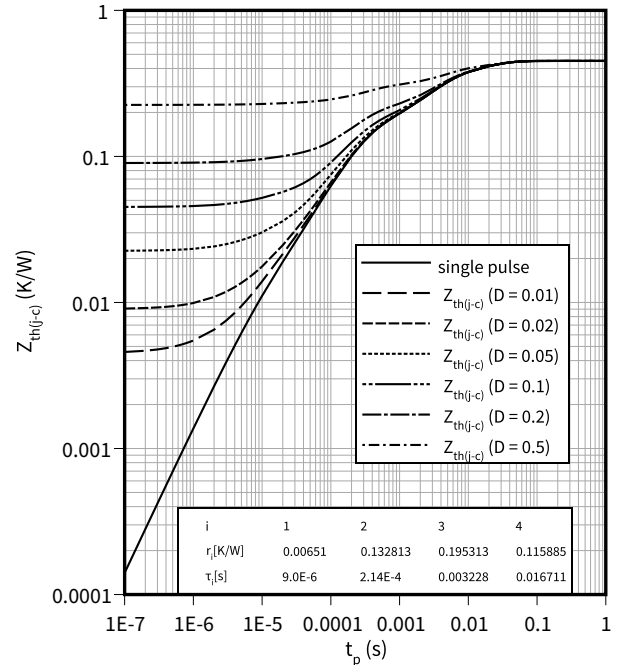
Typical capacitance as a function of collector-emitter voltage

$C = f(V_{CE})$
 $f = 100 \text{ kHz}, V_{GE} = 0 \text{ V}$



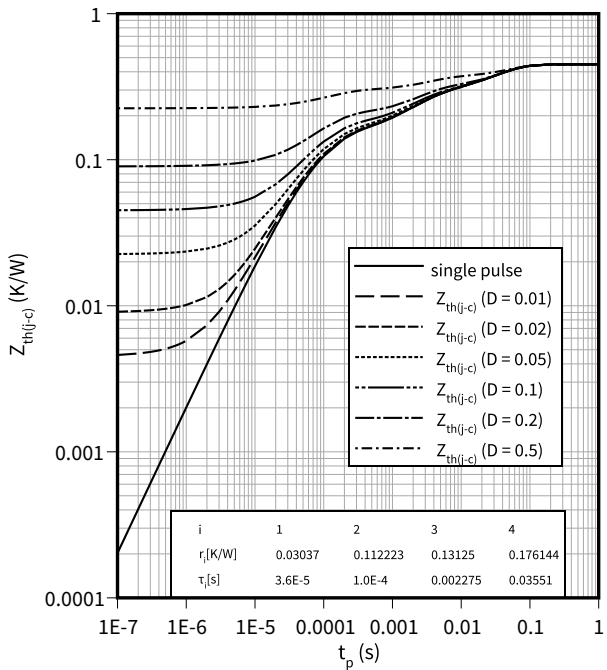
IGBT transient thermal impedance as a function of pulse width

$Z_{th(j-c)} = f(t_p)$
 $D = t_p/T$



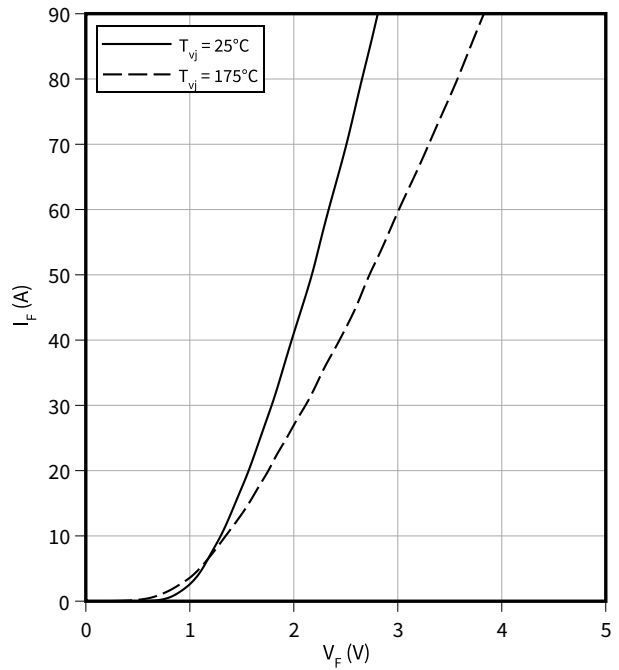
Diode transient thermal impedance as a function of pulse width

$Z_{th(j-c)} = f(t_p)$
 $D = t_p/T$



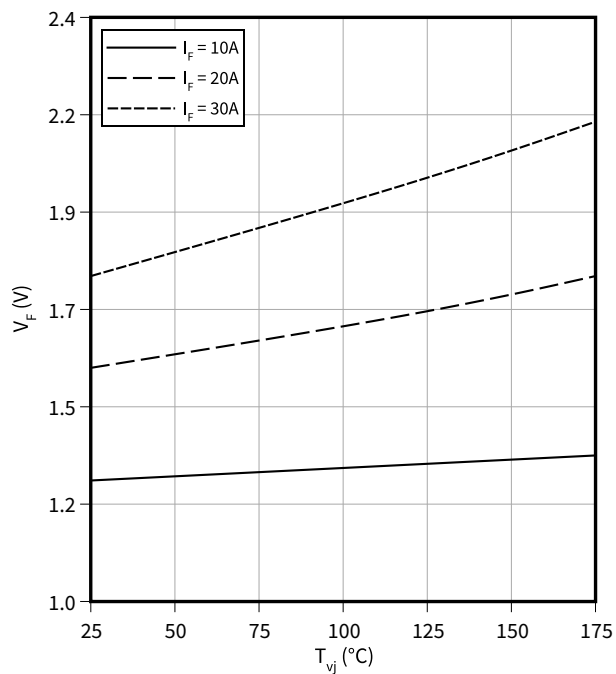
Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



Typical diode forward voltage as a function of junction temperature

$$V_F = f(T_{vj})$$



5 Package outlines

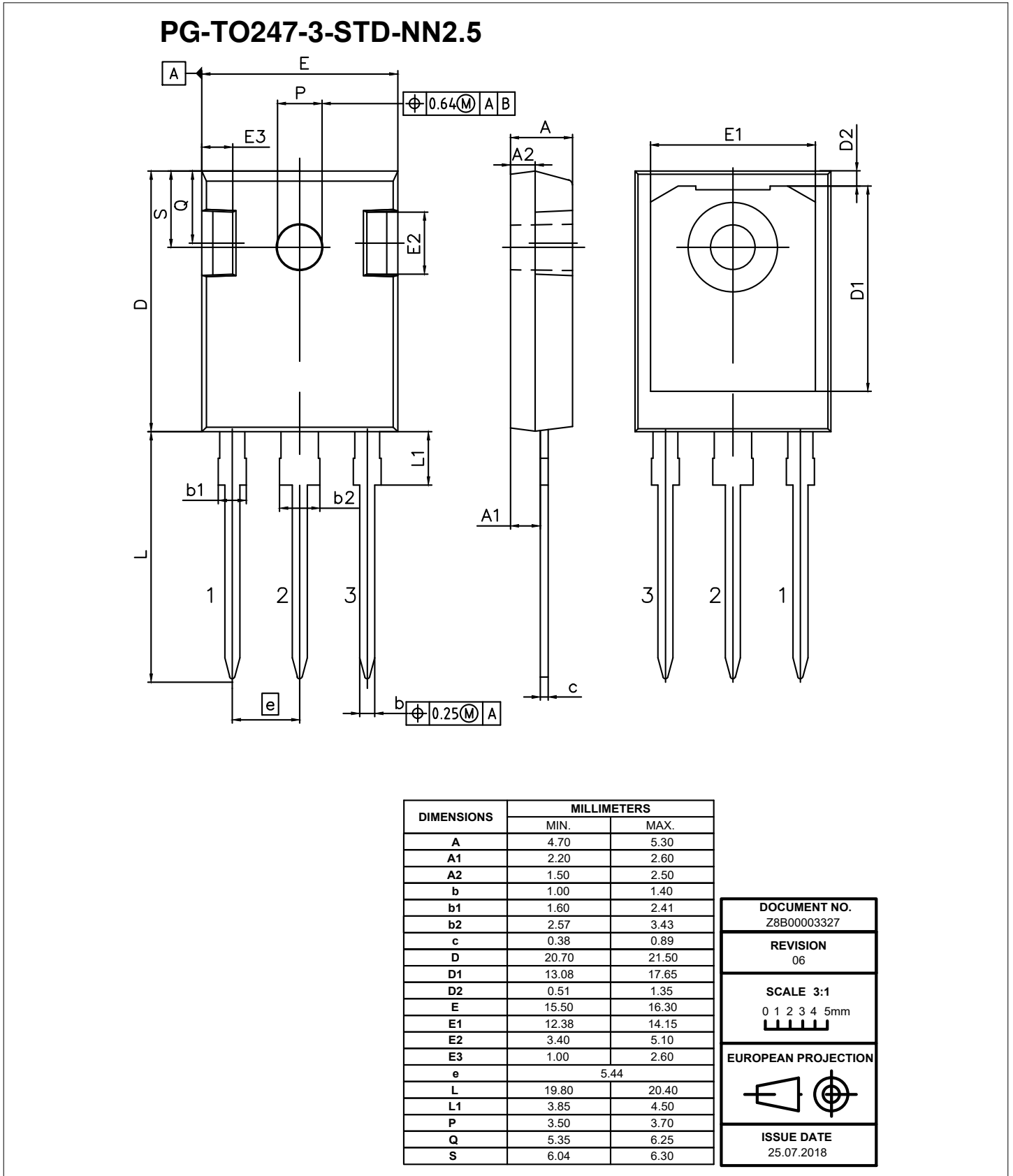


Figure 1

6 Testing conditions

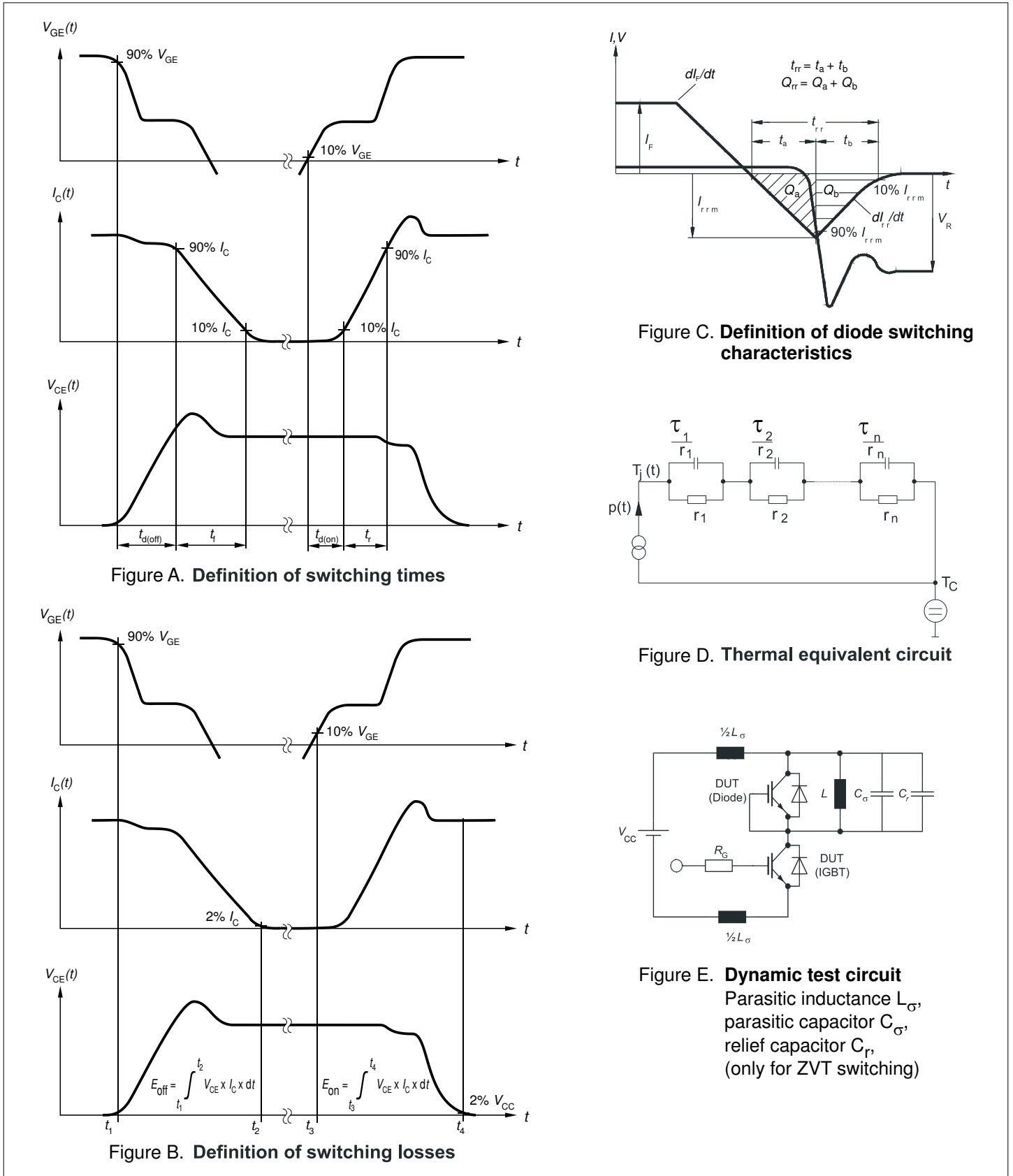


Figure 2

Revision history

Document revision	Date of release	Description of changes
1.00	2022-05-18	Final datasheet

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