

## Final datasheet

### Soft and ultra-fast recovery 1200 V Emitter controlled 7 diode for both Industrial and Home Appliance applications

#### Features

- $V_{RRM} = 1200\text{ V}$
- $I_F = 50\text{ A}$
- 1200 V emitter controlled technology
- Maximum junction temperature  $T_{vjmax} = 175^\circ\text{C}$
- Low forward voltage ( $V_F$ )
- Low reverse recovery charge
- Ultrafast recovery times
- Soft recovery characteristics
- Pb-free lead plating; RoHS compliant
- Humidity robust design

#### Potential applications

- String inverter
- EV-Charging
- Heat pump

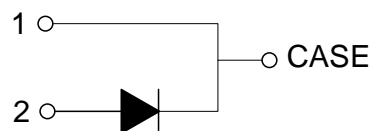
#### Product validation

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

#### Description

Pin definition:

- Pin 1 and backside - Cathode
- Pin 2 - Anode



Type	Package	Marking
IDWD50E120D7	PG-TO247-2-STD-NA8.8	E50MD7

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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		nH
Storage temperature	$T_{stg}$		-55		150	°C
Soldering temperature	$T_{sold}$	wave soldering 1.6 mm (0.063 in.) from case for 10 s			260	°C
Mounting torque	$M$	M3 screw, Maximum of mounting processes: 3			0.6	Nm
Thermal resistance, junction-ambient	$R_{th(j-a)}$				40	K/W
Diode thermal resistance, junction-case	$R_{th(j-c)}$			0.51	0.66	K/W

## 2 Diode

**Table 2** Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj} \geq 25 \text{ °C}$		1200	V
Diode forward current, limited by $T_{vjmax}$	$I_F$		$T_c = 25 \text{ °C}$	81	A
			$T_c = 100 \text{ °C}$	51	
Diode pulsed current, $t_p$ limited by $T_{vjmax}$	$I_{Fpulse}$			200	A
Diode surge non repetitive forward current, sine halfwave	$I_{FSM}$	$t_p = 10 \text{ ms}$	$T_c = 25 \text{ °C}$	218	A
Diode surge repetitive forward current, sine halfwave <sup>1)</sup>	$I_{FRM}$	$t_p = 10 \text{ ms}$	$T_c = 25 \text{ °C}$	150	A
Power dissipation	$P_{tot}$		$T_c = 25 \text{ °C}$	228	W
			$T_c = 100 \text{ °C}$	114	

1) Not subject to production test. The test was performed with 20k pulses (half-wave rectified sine with 10 ms period).

Table 3 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Diode forward voltage	$V_F$	$I_F = 50 \text{ A}$	$T_{vj} = 25 \text{ }^\circ\text{C}$		2.5	3	V
			$T_{vj} = 150 \text{ }^\circ\text{C}$		2.35		
			$T_{vj} = 175 \text{ }^\circ\text{C}$		2.3		
Reverse leakage current	$I_R$	$V_R = 1200 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$			20	$\mu\text{A}$
			$T_{vj} = 175 \text{ }^\circ\text{C}$		780		
Diode reverse recovery time	$t_{rr}$	$V_R = 800 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$ , $I_F = 50 \text{ A}$ , $-di_F/dt = 1000 \text{ A}/\mu\text{s}$		160		ns
			$T_{vj} = 25 \text{ }^\circ\text{C}$ , $I_F = 25 \text{ A}$ , $-di_F/dt = 1000 \text{ A}/\mu\text{s}$		120		
			$T_{vj} = 175 \text{ }^\circ\text{C}$ , $I_F = 50 \text{ A}$ , $-di_F/dt = 1000 \text{ A}/\mu\text{s}$		200		
			$T_{vj} = 175 \text{ }^\circ\text{C}$ , $I_F = 25 \text{ A}$ , $-di_F/dt = 1000 \text{ A}/\mu\text{s}$		155		
Diode reverse recovery charge	$Q_{rr}$	$V_R = 800 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$ , $I_F = 50 \text{ A}$ , $-di_F/dt = 1000 \text{ A}/\mu\text{s}$		1.5		$\mu\text{C}$
			$T_{vj} = 25 \text{ }^\circ\text{C}$ , $I_F = 25 \text{ A}$ , $-di_F/dt = 1000 \text{ A}/\mu\text{s}$		1.05		
			$T_{vj} = 175 \text{ }^\circ\text{C}$ , $I_F = 50 \text{ A}$ , $-di_F/dt = 1000 \text{ A}/\mu\text{s}$		3.6		
			$T_{vj} = 175 \text{ }^\circ\text{C}$ , $I_F = 25 \text{ A}$ , $-di_F/dt = 1000 \text{ A}/\mu\text{s}$		2.6		

(table continues...)

Table 3 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Diode peak reverse recovery current	$I_{rrm}$	$V_R = 800\text{ V}$	$T_{vj} = 25\text{ °C},$ $I_F = 50\text{ A},$ $-di_F/dt = 1000\text{ A}/\mu\text{s}$		21		A
					19		
					35		
					32		
Diode peak rate of fall of reverse recovery current	$di_{rr}/dt$	$V_R = 800\text{ V}$	$T_{vj} = 25\text{ °C},$ $I_F = 50\text{ A},$ $-di_F/dt = 1000\text{ A}/\mu\text{s}$		165		A/ $\mu\text{s}$
					205		
					195		
					265		
Reverse recovery energy	$E_{rec}$	$V_R = 800\text{ V}$	$T_{vj} = 25\text{ °C},$ $I_F = 50\text{ A},$ $-di_F/dt = 1000\text{ A}/\mu\text{s}$		0.5		mJ
					0.35		
					1.3		
					0.9		
Operating junction temperature	$T_{vj}$			-40		175	°C

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

*Electrical Characteristic at  $T_{vj} = 25^{\circ}\text{C}$ , unless otherwise specified.*

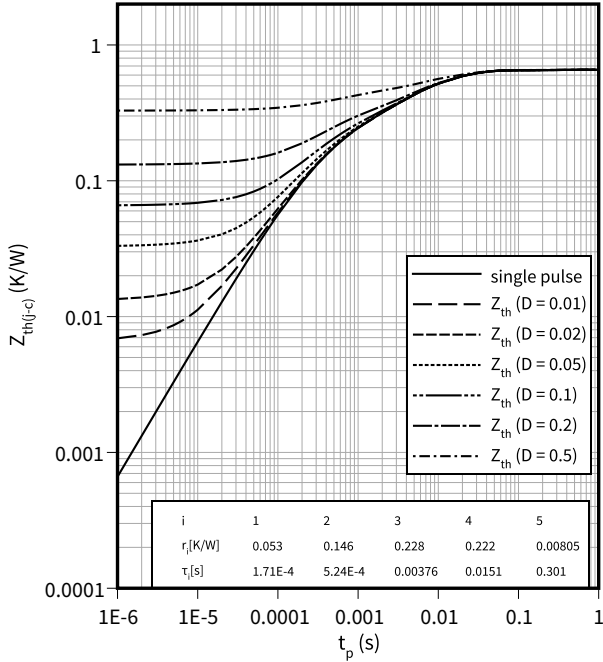
*Dynamic test circuit, parasitic inductance  $L_{\sigma} = 27 \text{ nH}$ , parasitic capacitor  $C_{\sigma} = 12 \text{ pF}$  from Fig. E, IKY50N120CH7 was used as IGBT.*

### 3 Characteristics diagrams

#### Diode transient thermal impedance as a function of pulse width

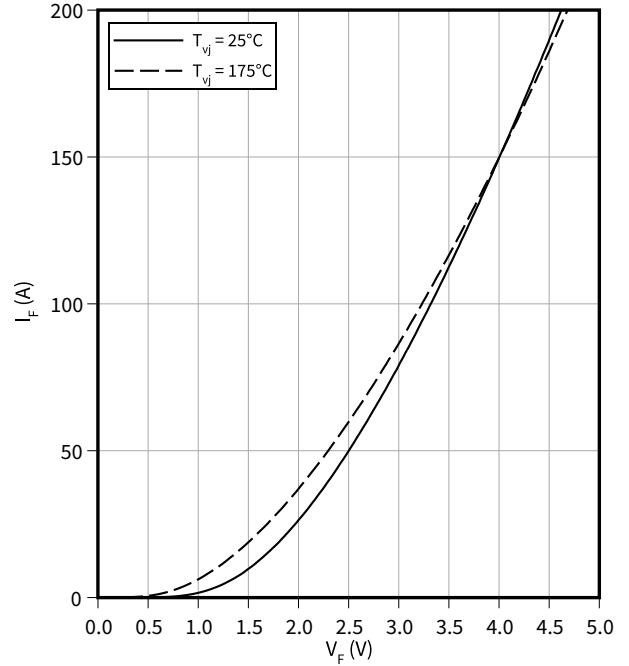
$$Z_{th(j-c)} = f(t_p)$$

$$D = t_p/T$$



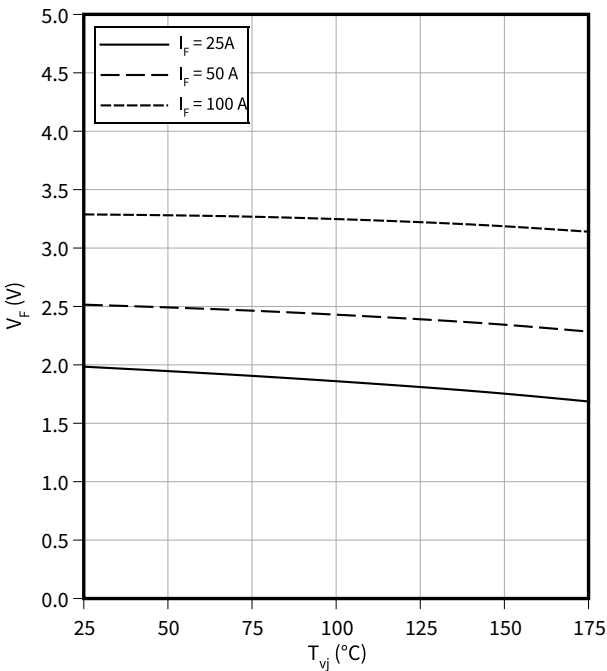
#### Typical diode forward current as a function of forward voltage

$$I_F = f(V_F)$$



#### Typical diode forward voltage as a function of junction temperature

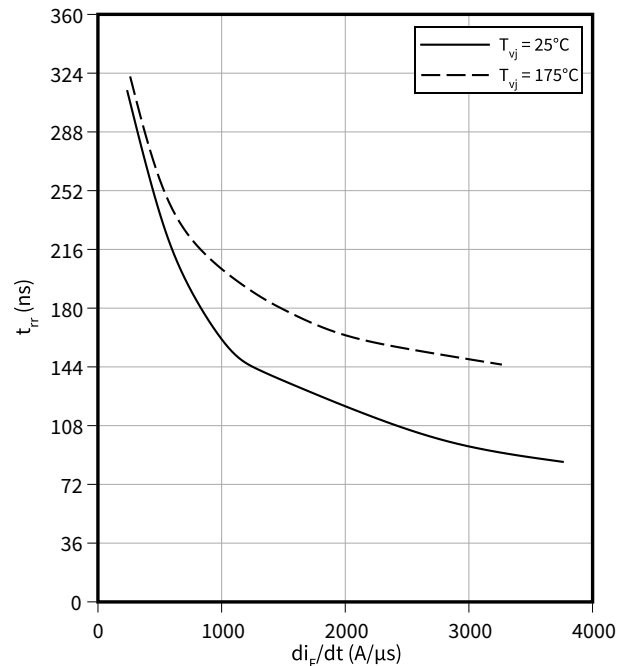
$$V_F = f(T_{vj})$$



#### Typical reverse recovery time as a function of diode current slope

$$t_{rr} = f(di_F/dt)$$

$V_R = 800 \text{ V}, I_F = 50 \text{ A}$

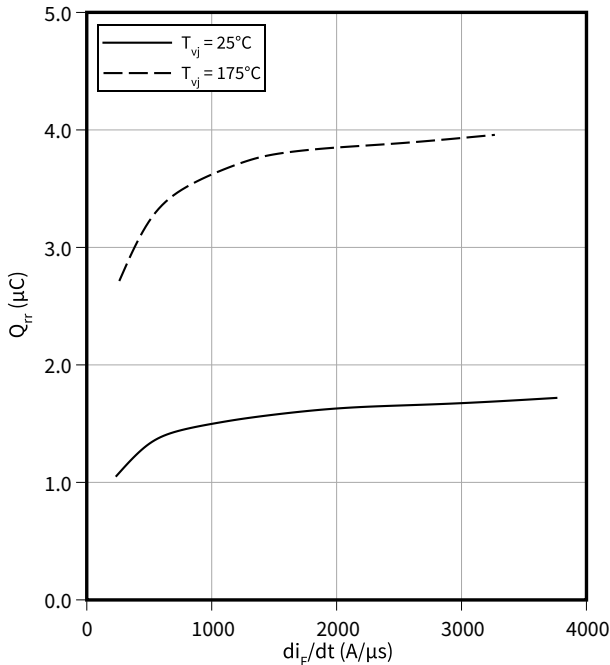


3 Characteristics diagrams

**Typical reverse recovery charge as a function of diode current slope**

$$Q_{rr} = f(di_F/dt)$$

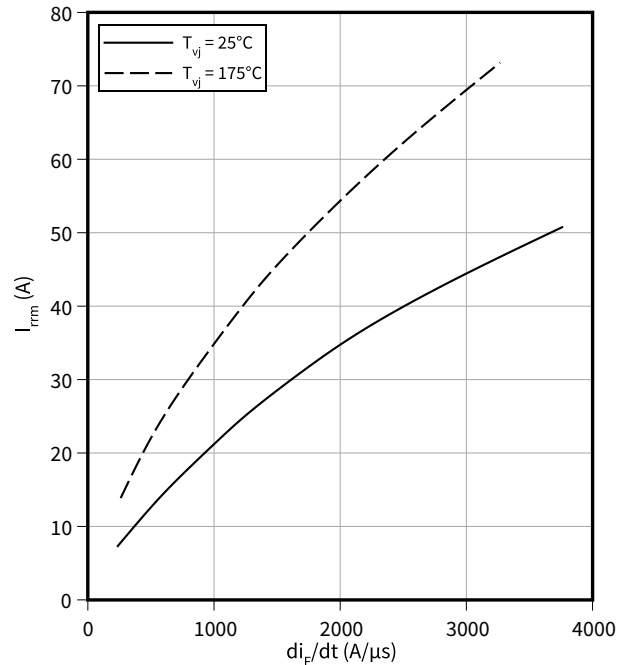
$V_R = 800 \text{ V}, I_F = 50 \text{ A}$



**Typical reverse recovery current as a function of diode current slope**

$$I_{rrm} = f(di_F/dt)$$

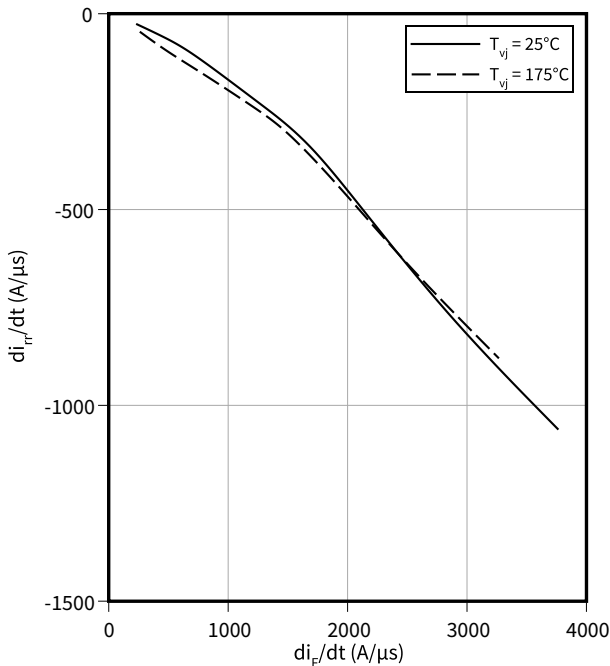
$V_R = 800 \text{ V}, I_F = 50 \text{ A}$



**Typical diode peak rate of fall of reverse recovery current as a function of diode current slope**

$$di_{rr}/dt = f(di_F/dt)$$

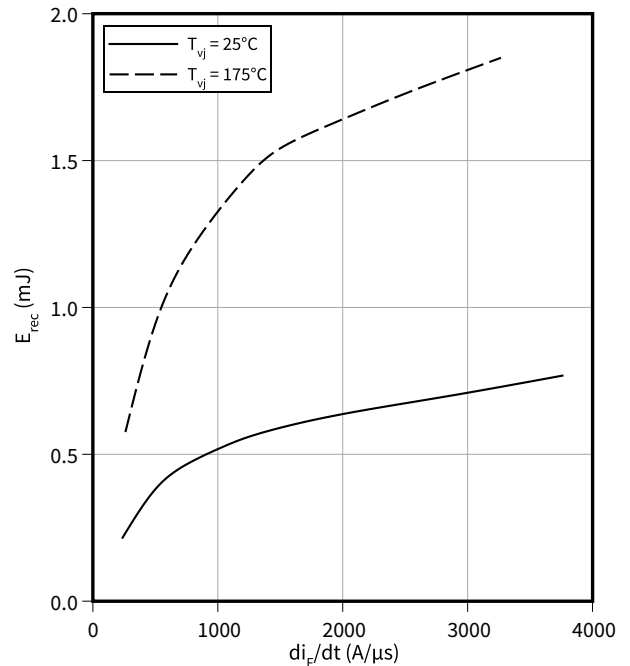
$V_R = 800 \text{ V}, I_F = 50 \text{ A}$



**Typical reverse energy losses as a function of diode current slope**

$$E_{rec} = f(di_F/dt)$$

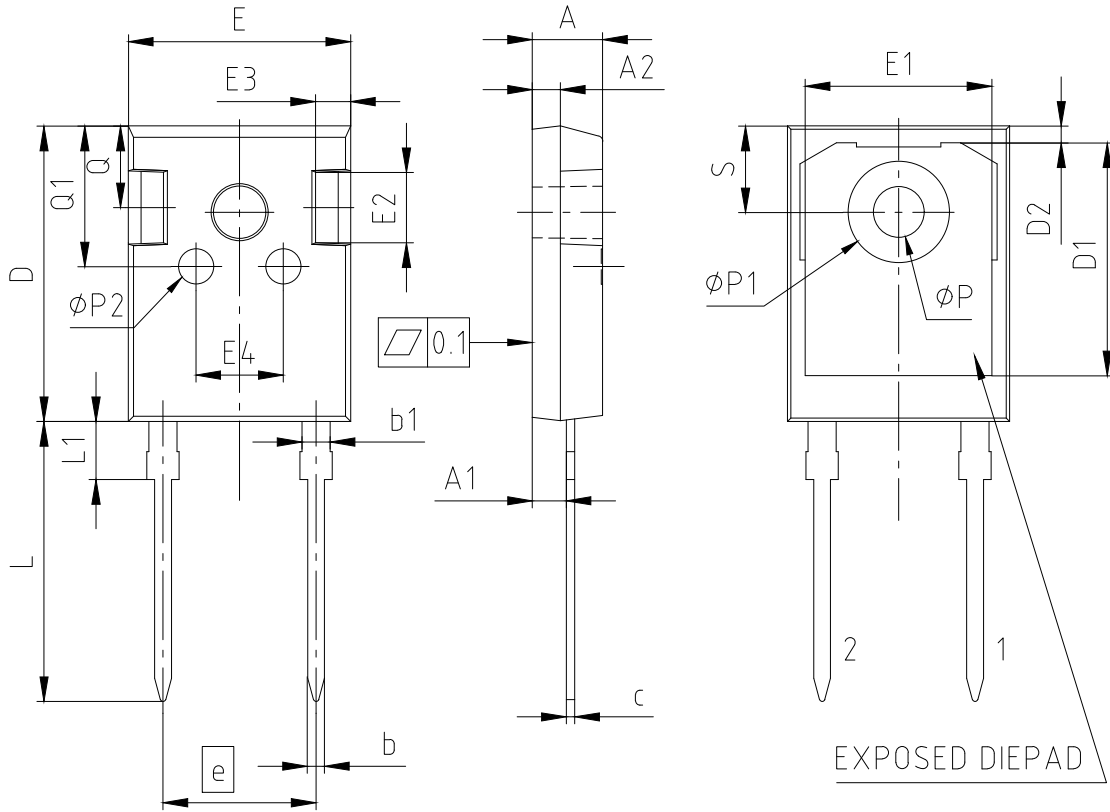
$V_R = 800 \text{ V}, I_F = 50 \text{ A}$





4 Package outlines

PG-TO247-2-STD-NA8.8



PACKAGE - GROUP NUMBER:		PG-TO247-2-U01			
DIMENSIONS	MILLIMETERS				
	MIN.	MAX.			
A	4.90	5.10	L	19.80	20.10
A1	2.31	2.51	L1	---	4.30
A2	1.90	2.10	øP	3.50	3.70
b	1.16	1.26	øP1	7.00	7.40
b1	1.96	2.06	øP2	2.40	2.60
c	0.59	0.66	Q	5.60	6.00
D	20.90	21.10	Q1	9.80	10.20
D1	16.25	16.85	S	6.05	6.25
D2	1.05	1.35			
E	15.70	15.90			
E1	13.10	13.50			
E2	4.90	5.10			
E3	2.40	2.60			
E4	6.00	6.40			
e	10.88				
N	2				

ALL DIMENSIONS DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

Figure 1

5 Testing conditions

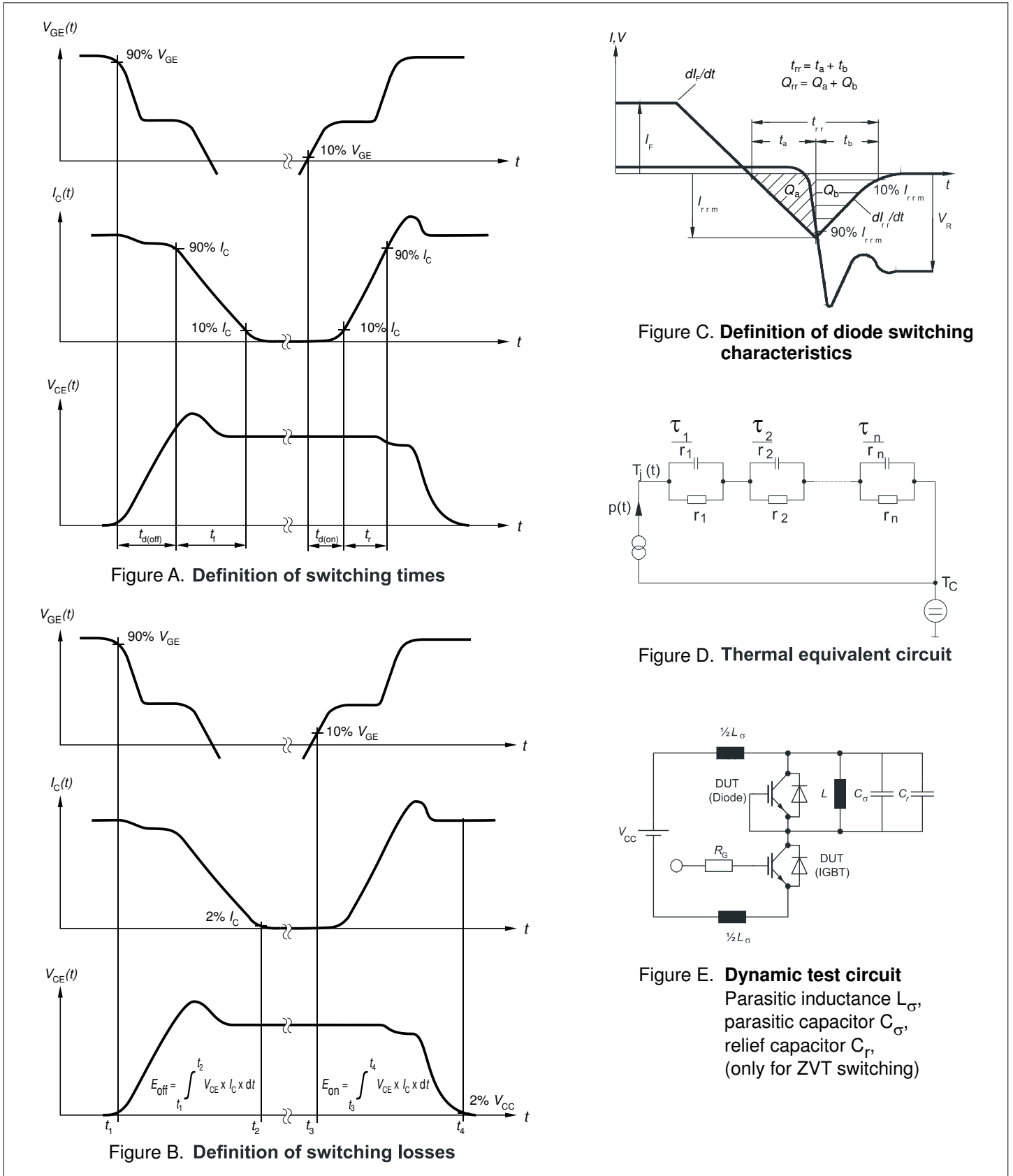


Figure 2

**Revision history**

<b>Document revision</b>	<b>Date of release</b>	<b>Description of changes</b>
1.00	2023-12-15	Final datasheet

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