

Emitter Controlled Rapid-1 Diode in Advanced Isolation with fully isolated package

Features

- $V_{RRM} = 650\text{ V}$
- $I_F = 2 \times 40\text{ A}$
- 650 V emitter controlled technology
- Temperature stable behaviour of key parameters
- Low forward voltage (V_F)
- Low reverse recovery charge (Q_{rr})
- Low reverse recovery current (I_{rrm})
- Maximum junction temperature $T_{vjmax} = 175^\circ\text{C}$
- 2500 V_{RMS} electrical isolation, 50/60 Hz, $t = 1\text{ min}$
- 100% tested isolated mounting surface
- Pb-free lead plating
- RoHS compliant

Potential applications

- Air conditioning
- General purpose drives (GPD)
- Industrial SMPS

Product validation

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

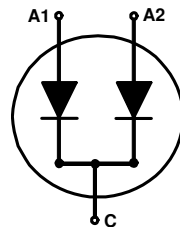
Description

- Pin 1 – anode (A1)
- Pin 2 – cathode (C)
- Pin 3 – anode (A2)



Fully isolated package TO-247

- Lead-free
- Green
- Halogen-free
- RoHS



Type	Package	Marking
IDFW80C65D1	PG-TO247-3-AI	C80ED1

Table of contents

	Description	1
	Features	1
	Potential applications	1
	Product validation	1
	Table of contents	2
1	Package	3
2	Diode	3
3	Characteristics diagrams	5
4	Package outlines	8
5	Testing conditions	9
	Revision history	10
	Disclaimer	11

1 Package

Table 1 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Isolation test voltage RMS ¹⁾	V_{isol}				2500	V
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 1.6mm (0.063in.) from case for 10s			260	°C
Mounting torque	M	M3 screw Maximum of mounting process: 3			0.6	Nm
Thermal resistance, junction-ambient	$R_{th(j-a)}$				65	K/W

1) For a proper handling and assembly of the advanced isolation device in the application refer to the note at the package drawing.

2 Diode

Table 2 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} \geq 25\text{ °C}$	650	V	
Diode forward current, limited by T_{vjmax}	I_F		$T_h = 25\text{ °C}$	74	A
			$T_h = 65\text{ °C}$	59	
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpulse}		160	A	
Diode surge non repetitive forward current, sine halfwave	I_{FSM}	$T_h = 25\text{ °C}, t_p = 10\text{ ms}$	320	A	
Power dissipation	P_{tot}		$T_h = 25\text{ °C}$	112	W
			$T_h = 65\text{ °C}$	82	

Table 3 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Diode forward voltage	V_F	$I_F = 40\text{ A}$		$T_{vj} = 25\text{ °C}$	1.45	1.7	V
				$T_{vj} = 175\text{ °C}$	1.39		
Reverse leakage current ¹⁾	I_R	$V_R = 650\text{ V}$		$T_{vj} = 25\text{ °C}$		40	μA
				$T_{vj} = 175\text{ °C}$		1200	

(table continues...)

Table 3 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Diode reverse recovery time	t_{rr}	$V_R = 400\text{ V}$	$T_{vj} = 25\text{ °C}$, $I_F = 40\text{ A}$, $-di_F/dt = 820\text{ A}/\mu\text{s}$		73	ns
			$T_{vj} = 150\text{ °C}$, $I_F = 40\text{ A}$, $-di_F/dt = 820\text{ A}/\mu\text{s}$		120	
Diode reverse recovery charge	Q_{rr}	$V_R = 400\text{ V}$	$T_{vj} = 25\text{ °C}$, $I_F = 40\text{ A}$, $-di_F/dt = 820\text{ A}/\mu\text{s}$		1.1	μC
			$T_{vj} = 150\text{ °C}$, $I_F = 40\text{ A}$, $-di_F/dt = 820\text{ A}/\mu\text{s}$		2.62	
Diode peak reverse recovery current	I_{rrm}	$V_R = 400\text{ V}$	$T_{vj} = 25\text{ °C}$, $I_F = 40\text{ A}$, $-di_F/dt = 820\text{ A}/\mu\text{s}$		23.5	A
			$T_{vj} = 150\text{ °C}$, $I_F = 40\text{ A}$, $-di_F/dt = 820\text{ A}/\mu\text{s}$		36	
Diode peak rate of fall of reverse recovery current	di_{rr}/dt	$V_R = 400\text{ V}$	$T_{vj} = 25\text{ °C}$, $I_F = 40\text{ A}$, $-di_F/dt = 820\text{ A}/\mu\text{s}$		1500	$\text{A}/\mu\text{s}$
			$T_{vj} = 150\text{ °C}$, $I_F = 40\text{ A}$, $-di_F/dt = 820\text{ A}/\mu\text{s}$		1250	
Diode thermal resistance, junction - heatsink ²⁾	R_{thjh}			1.14	1.34	K/W
Operating junction temperature	T_{vj}		-40		175	$^{\circ}\text{C}$

1) Reverse leakage current per leg specified for operating conditions with zero voltage applied to the other leg.

2) At force on body $F = 500\text{ N}$, $T_a = 25^{\circ}\text{C}$

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

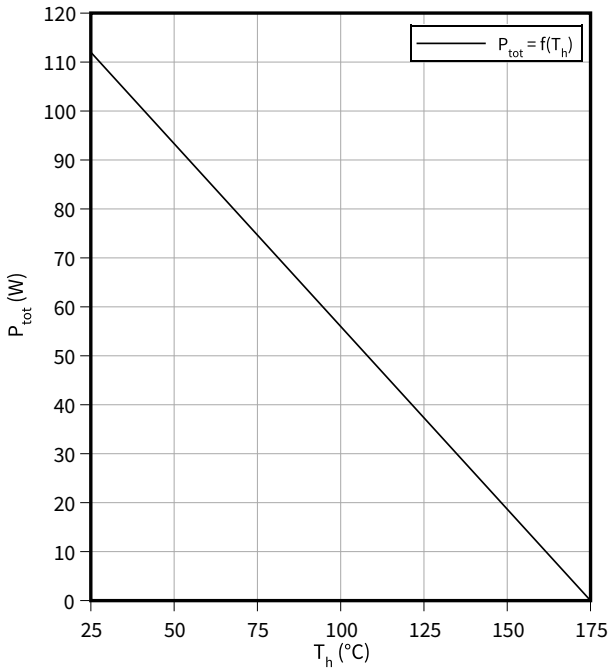
Electrical Characteristic (per leg) at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified.

Dynamic test circuit, $L_{\sigma} = 30\text{ nH}$, $C_{\sigma} = 40\text{ pF}$, switch IKW40N65ES5.

3 Characteristics diagrams

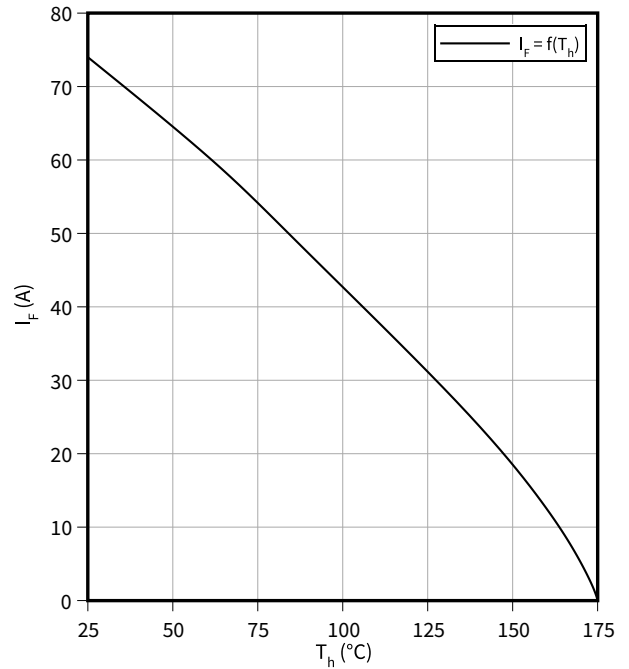
Power dissipation per leg as a function of heatsink temperature

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



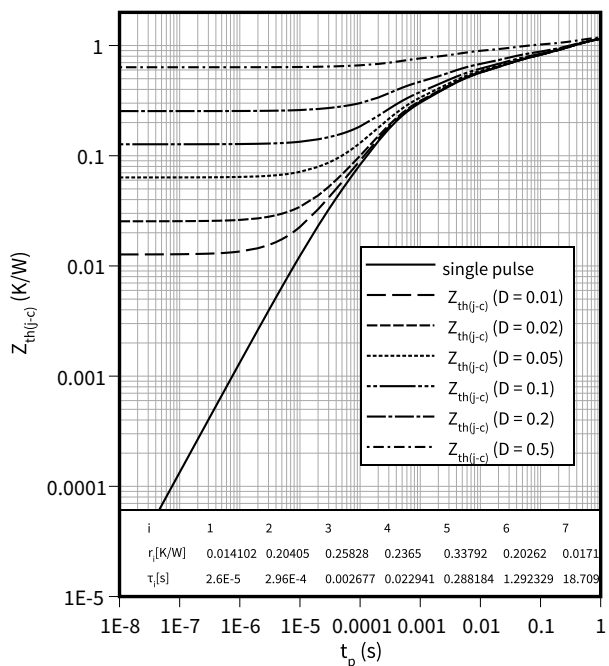
Diode forward current per leg as a function of heatsink temperature

$I_F = f(T_h)$



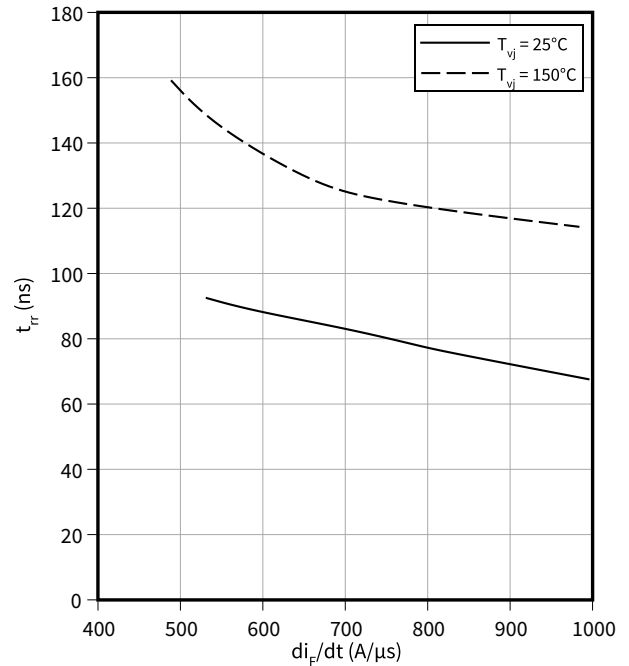
Diode transient thermal impedance per leg as a function of pulse width

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



Typical reverse recovery time per leg as a function of diode current slope

$t_{rr} = f(di_F/dt)$
 $V_R = 400\text{ V}, I_F = 40\text{ A}$

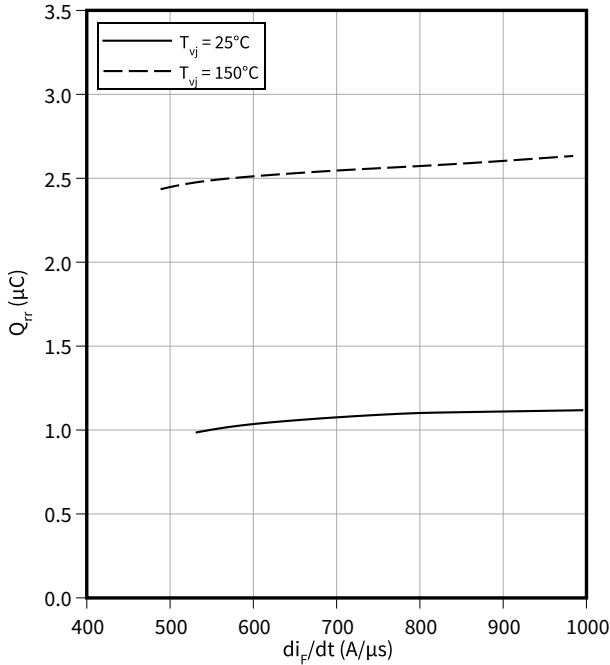


3 Characteristics diagrams

Typical reverse recovery charge per leg as a function of diode current slope

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

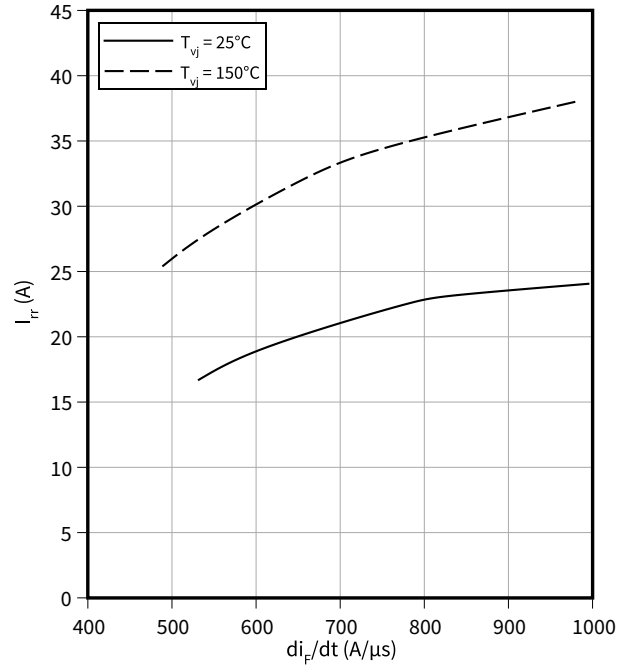
$V_R = 400\text{ V}, I_F = 40\text{ A}$



Typical reverse recovery current per leg as a function of diode current slope

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

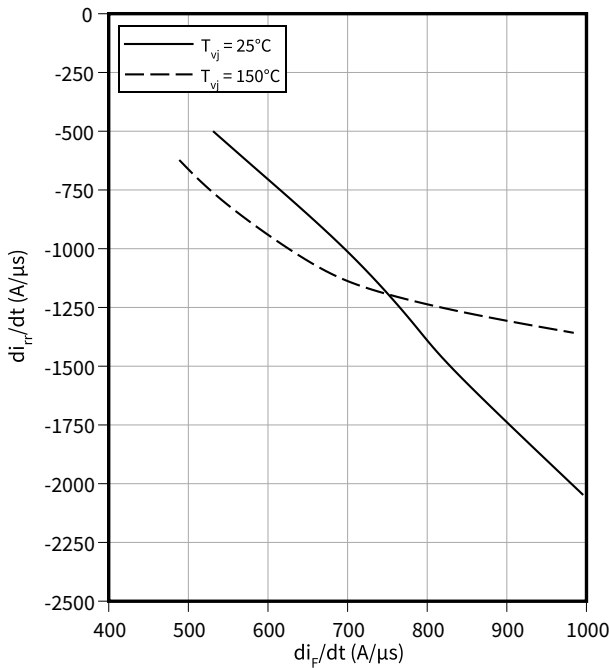
$V_R = 400\text{ V}, I_F = 40\text{ A}$



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

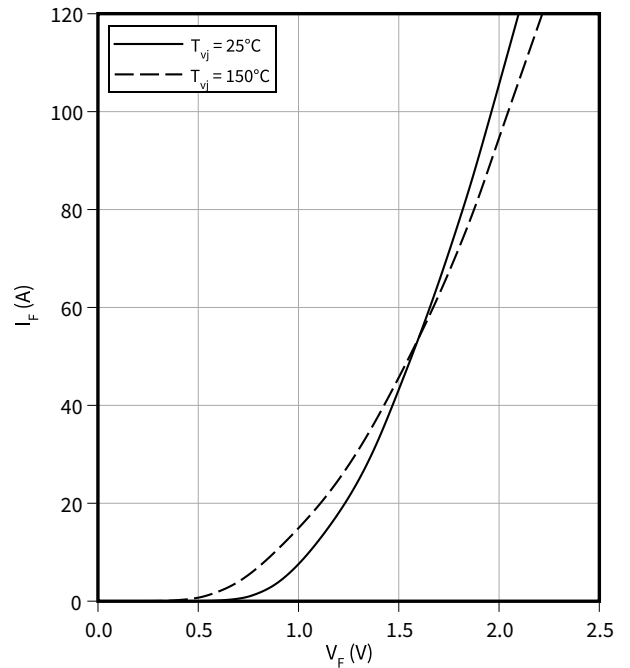
$$di_{rr}/dt = f(di_F/dt)$$

$V_R = 400\text{ V}, I_F = 40\text{ A}$



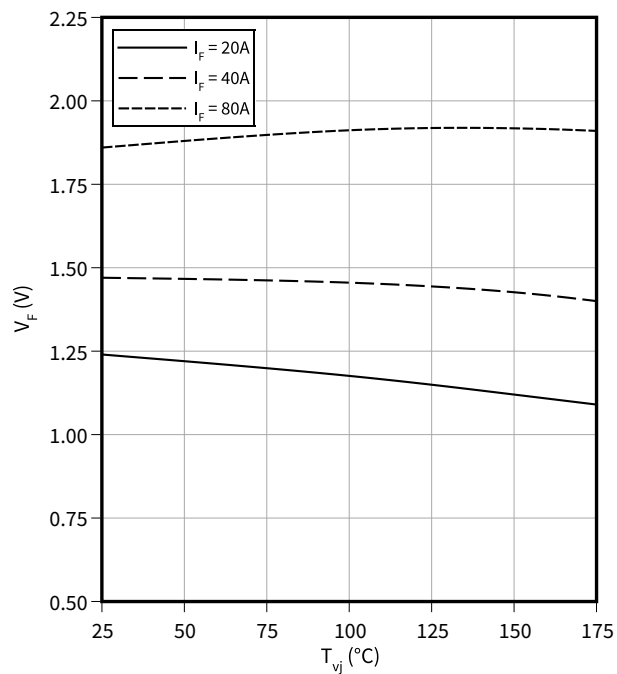
Typical diode forward current per leg as a function of forward voltage

$$I_F = f(V_F)$$



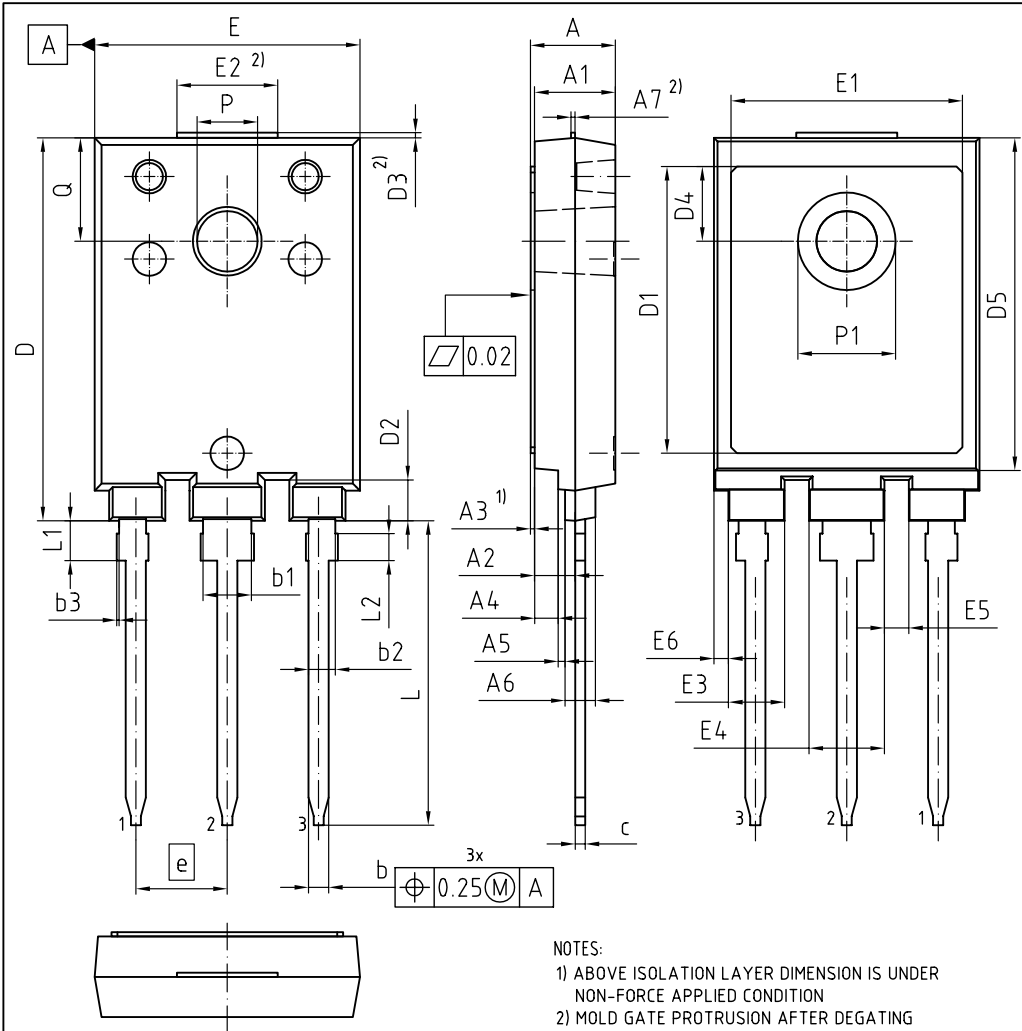
Typical diode forward voltage per leg as a function of junction temperature

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



4 Package outlines

PG-HSIP247-3-2



NOTES:
 1) ABOVE ISOLATION LAYER DIMENSION IS UNDER NON-FORCE APPLIED CONDITION
 2) MOLD GATE PROTRUSION AFTER DEGATING
 ALL METAL SURFACES TIN PLATED EXCEPT AREA OF CUT

DIMENSIONS	MILLIMETERS		DIMENSIONS	MILLIMETERS	
	MIN.	MAX.		MIN.	MAX.
A	-	5.18	e	5.44	
A1	4.70	4.90	E	15.70	15.90
A2	2.16	2.66	E1	13.68	13.88
A3	0.20	0.28	E2	(6.00)	
A4	1.30	1.50	E3	3.24	3.44
A5	0.31	0.51	E4	4.39	4.59
A6	1.70	1.90	E5	(1.45)	
A7	(0.25)		E6	0.76	0.96
b	1.10	1.30	L	18.01	18.21
b1	(2.88)		L1	2.26	2.46
b2	(1.60)		L2	1.50	1.70
b3	-	0.15	P	3.50	3.70
c	0.50	0.70	P1	5.70	5.90
D	22.70	22.90	Q	6.06	6.26
D1	16.96	17.16			
D2	2.34	2.54			
D3	-	0.30			
D4	4.35	4.55			
D5	19.70	19.90			

DOCUMENT NO. Z8B00195711
REVISION 01
SCALE 3:1 0 1 2 3 4 5 6 7 8mm
EUROPEAN PROJECTION
ISSUE DATE 28.06.2019

Figure 1

5 Testing conditions

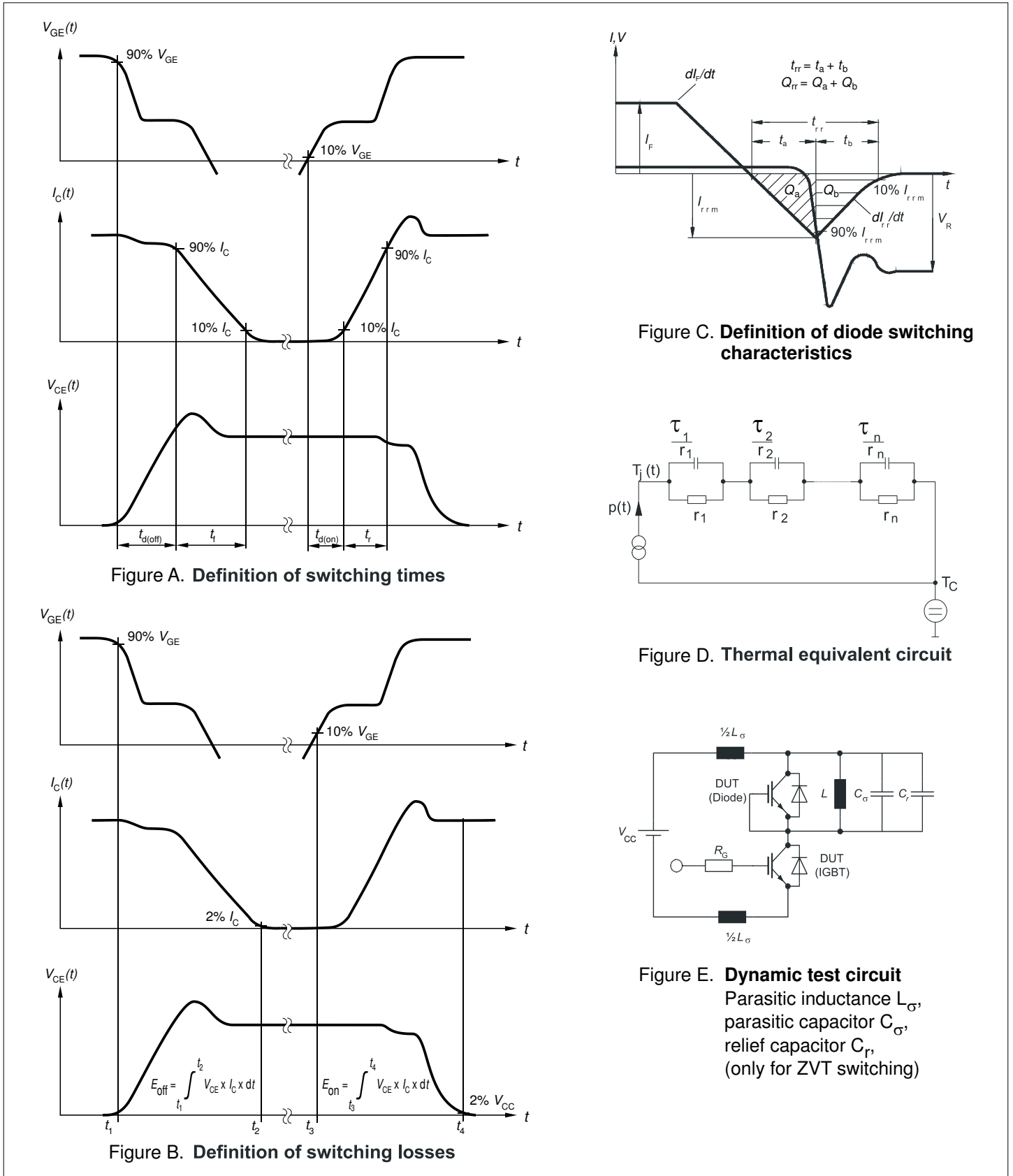


Figure 2

Revision history

Document revision	Date of release	Description of changes
V2.1	2020-07-09	Target datasheet
V2.2	2020-09-25	New marking description
n/a	2020-11-30	Datasheet migrated to a new system with a new layout and new revision number schema: target or preliminary datasheet = 0.xy; final datasheet = 1.xy
1.10	2022-06-24	Correction of package outline drawing on page 8

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2022-06-24

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2022 Infineon Technologies AG

All Rights Reserved.

Do you have a question about any aspect of this document?

Email: erratum@infineon.com

Document reference

IFX-AAL426-003

Important notice

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffheitsgarantie").

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Please note that this product is not qualified according to the AEC Q100 or AEC Q101 documents of the Automotive Electronics Council.

Warnings

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.