Final datasheet

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

Features

- V_{RRM} = 1200 V
- I_F = 120 A
- 1200 V emitter controlled technology
- Maximum junction temperature T_{vjmax} = 175°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

Green
Halogen-free
Lead-free
RoHS

Potential applications

- String inverter
- EV-Charging
- Heat pump

Product validation

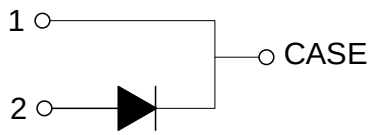
- Qualified for industrial applications according to the relevant tests of JEDEC47/20/22

Description

Pin definition:

• Pin 1 and backside - Cathode

• Pin 2 - Anode



Type	Package	Marking
IDWD120E120D7	PG-TO247-2-STD-NA8.8	E120MD7

Table of contents

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	$R_{th(j-c)}$			0.24	0.31	K/W

2 Diode

Table 2 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} \geq 25$ °C		1200	V
Diode forward current, limited by T_{vjmax}	I_F		$T_c = 25$ °C	177	A
			$T_c = 91$ °C	120	
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpulse}			480	A
Diode surge non repetitive forward current, sine halfwave	I_{FSM}	$t_p = 10$ ms	$T_c = 25$ °C	420	A
Diode surge repetitive forward current, sine halfwave[1)]	I_{FRM}	$t_p = 10$ ms	$T_c = 25$ °C	360	A
Power dissipation	P_{tot}		$T_c = 25$ °C	478	W
			$T_c = 100$ °C	239	

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 = 120 A	T_{vj} = 25 °C		2.5	3	V
			T_{vj} = 150 °C		2.35		
			T_{vj} = 175 °C		2.3		
Reverse leakage current	I_R	V_R = 1200 V	T_{vj} = 25 °C			20	µA
			T_{vj} = 175 °C		2200		
Diode reverse recovery time	t_{rr}	V_R = 800 V	T_{vj} = 25 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		215		ns
			T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		190		
			T_{vj} = 175 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		230		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		205		
Diode reverse recovery charge	Q_{rr}	V_R = 800 V	T_{vj} = 25 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		2.7		µC
			T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		2.05		
			T_{vj} = 175 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		6.05		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		4.55		

(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 V	T_{vj} = 25 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		25		A
			T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		23		
			T_{vj} = 175 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		42		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		40		
Diode peak rate of fall of reverse recovery current	di_{rr}/dt	V_R = 800 V	T_{vj} = 25 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		120		A/µs
			T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		140		
			T_{vj} = 175 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		185		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		240		
Reverse recovery energy	E_{rec}	V_R = 800 V	T_{vj} = 25 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		0.75		mJ
			T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		0.6		
			T_{vj} = 175 °C, I_F = 120 A, $-di_F/dt$ = 1000 A/µs		1.75		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		1.3		
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.*

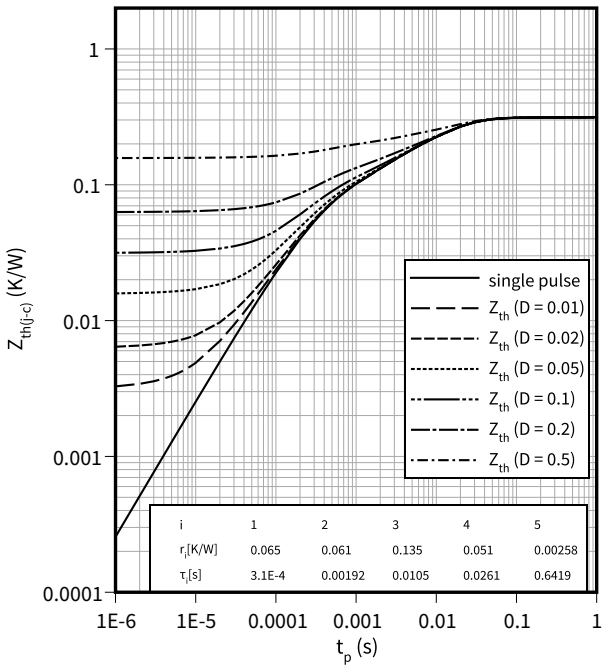
Electrical Characteristic at T_{vj} = 25°C, unless otherwise specified.

Dynamic test circuit, parasitic inductance L_{σ} = 27 nH, parasitic capacitor C_{σ} = 12 pF from Fig. E, IKY140N120CH7 was used as IGBT.

3 Characteristics diagrams

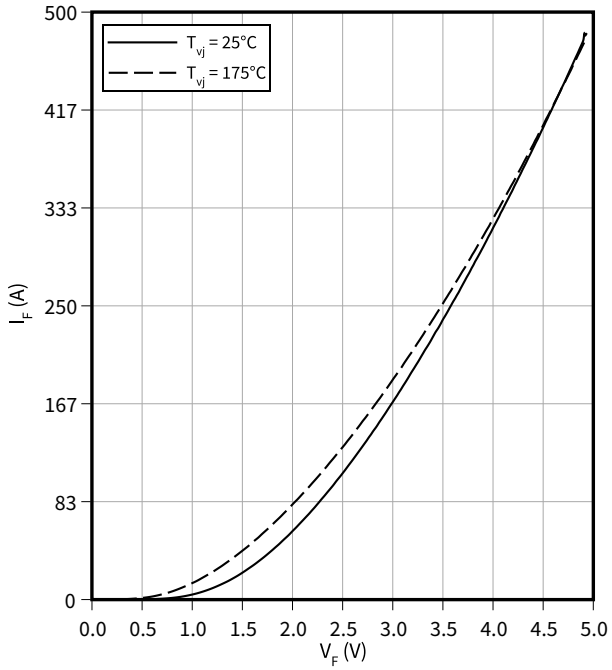
Diode transient thermal impedance as a function of pulse width

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



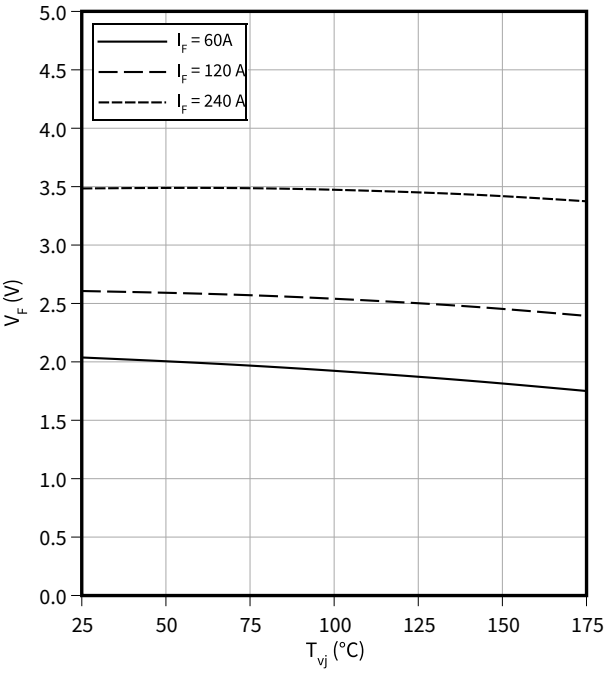
Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



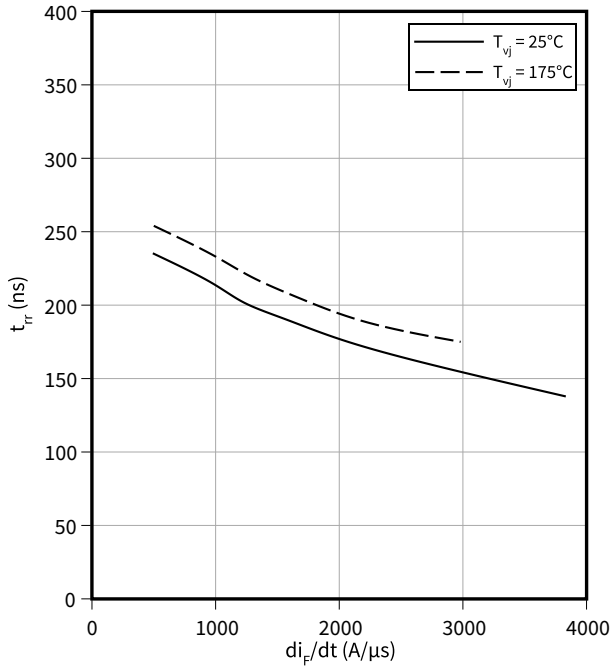
Typical diode forward voltage as a function of junction temperature

$V_F = f(T_{vj})$



Typical reverse recovery time as a function of diode current slope

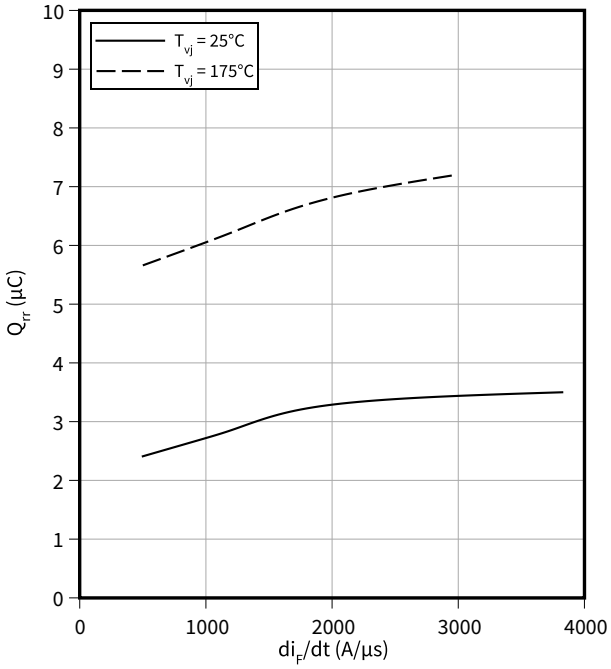
$t_{rr} = f(di_F/dt)$
V_R = 800 V, I_F = 120 A



Typical reverse recovery charge as a function of diode current slope

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

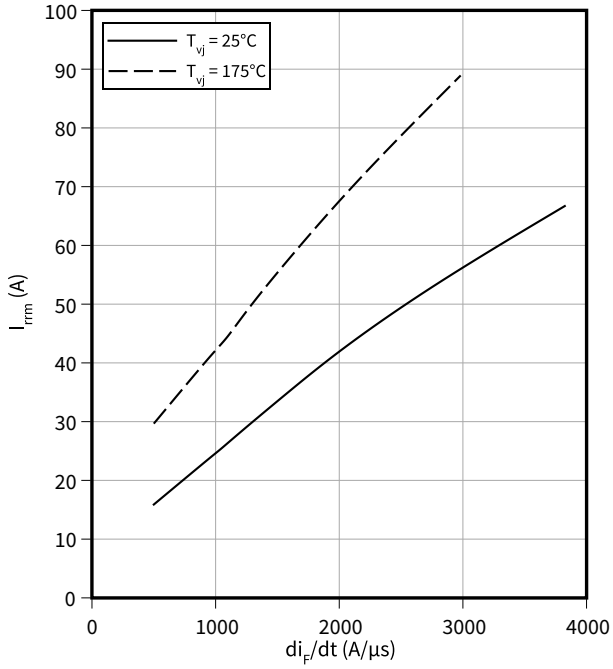
$V_R = 800\ V$, $I_F = 120\ A$



Typical reverse recovery current as a function of diode current slope

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

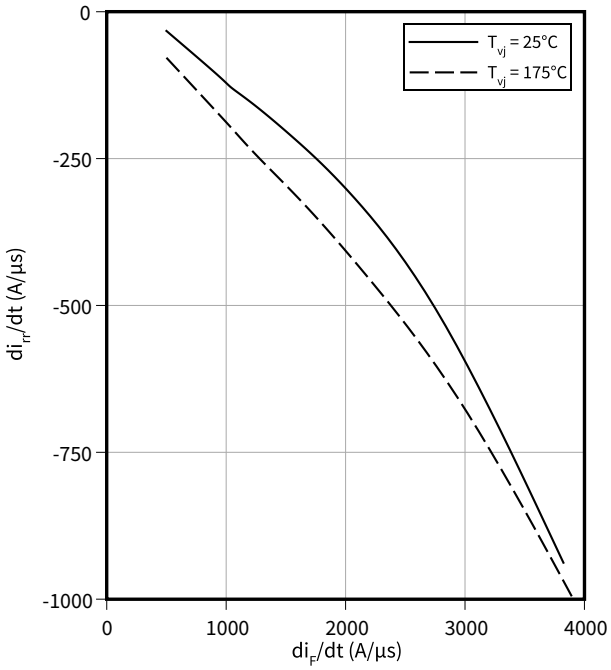
$V_R = 800\ V$, $I_F = 120\ A$



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

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

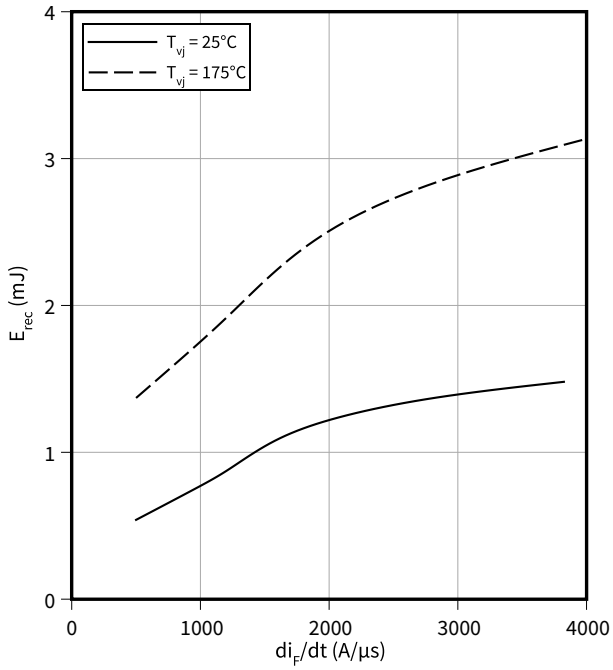
$V_R = 800\ V$, $I_F = 120\ A$



Typical reverse energy losses as a function of diode current slope

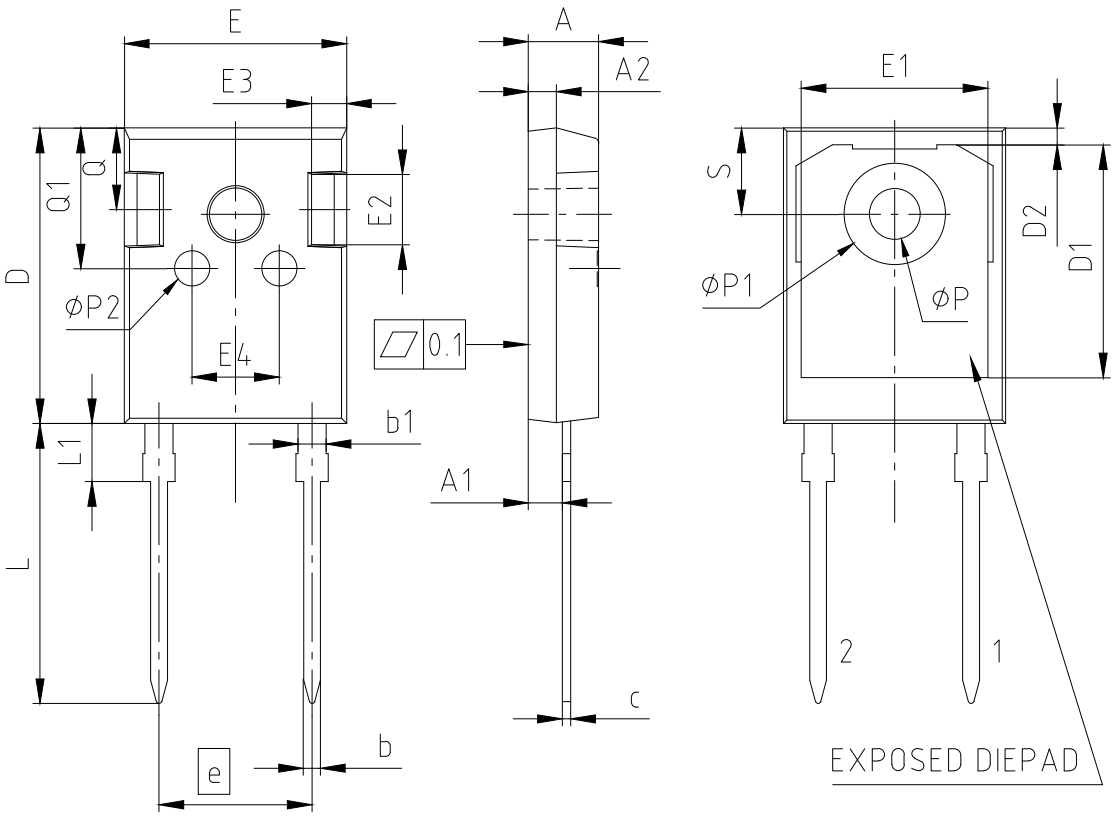
$E_{rec} = f(di_F/dt)$

$V_R = 800\ V$, $I_F = 120\ A$



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
A1	2.31	2.51
A2	1.90	2.10
b	1.16	1.26
b1	1.96	2.06
c	0.59	0.66
D	20.90	21.10
D1	16.25	16.85
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	

L	19.80	20.10
L1	---	4.30
øP	3.50	3.70
øP1	7.00	7.40
øP2	2.40	2.60
Q	5.60	6.00
Q1	9.80	10.20
S	6.05	6.25

ALL DIMENSIONS DO NOT INCLUDE
MOLD FLASH OR PROTRUSIONS.

Figure 1

5 Testing conditions

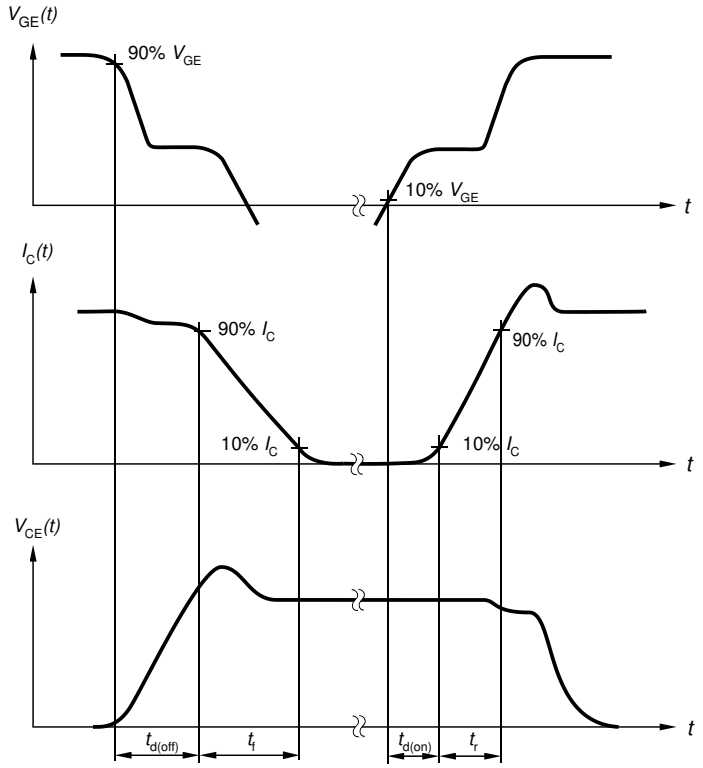


Figure A. **Definition of switching times**

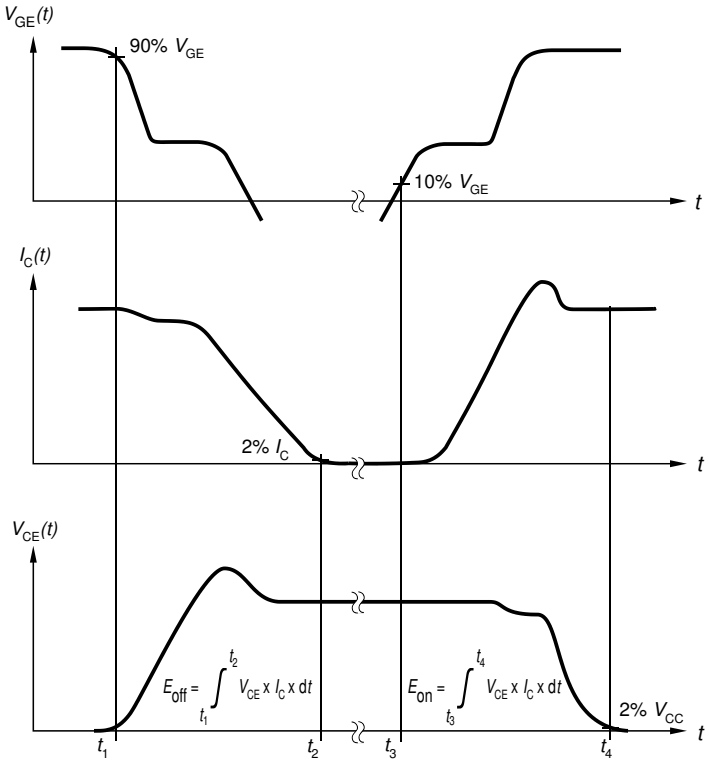


Figure B. **Definition of switching losses**

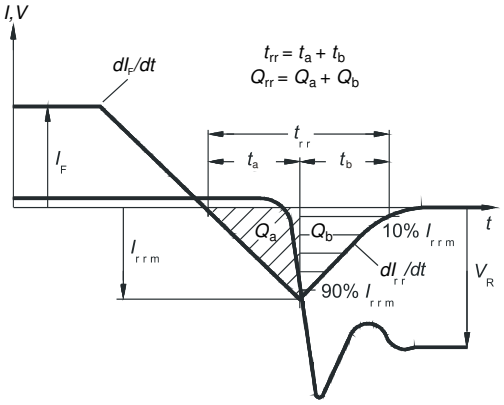


Figure C. **Definition of diode switching characteristics**

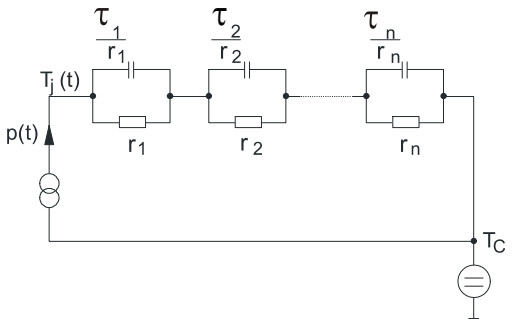


Figure D. **Thermal equivalent circuit**

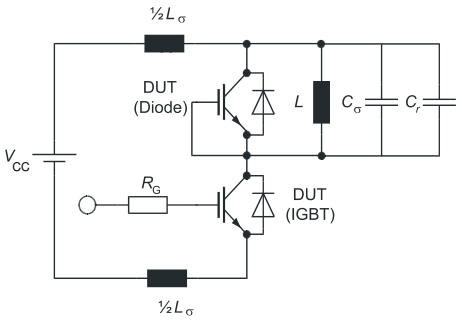


Figure E. **Dynamic test circuit**
Parasitic inductance L_σ,
parasitic capacitor C_σ,
relief capacitor C_r,
(only for ZVT switching)

Figure 2

Revision history

Document revision	Date of release	Description of changes
1.00	2023-12-15	Final datasheet

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