IDWD60E120D7

Soft and ultra-fast recovery 1200 V Emitter controlled 7 diode

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 = 60 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

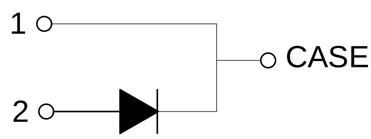
- Qualified for industrial applications according to the relevant tests of JEDEC47/20/22

Description

Pin definition:

• Pin 1 and backside - Cathode

• Pin 2 - Anode



Type	Package	Marking
IDWD60E120D7	PG-TO247-2-STD-NA8.8	E60MD7

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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	$R_{th(j-c)}$			0.44	0.57	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	94	A
			$T_c = 100$ °C	60	
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpulse}			240	A
Diode surge non repetitive forward current, sine halfwave	I_{FSM}	$t_p = 10$ ms	$T_c = 25$ °C	228	A
Diode surge repetitive forward current, sine halfwave[1)]	I_{FRM}	$t_p = 10$ ms	$T_c = 25$ °C	180	A
Power dissipation	P_{tot}		$T_c = 25$ °C	265	W
			$T_c = 100$ °C	132	

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 = 60 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		1000		
Diode reverse recovery time	t_{rr}	V_R = 800 V	T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		175		ns
			T_{vj} = 25 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		140		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		200		
			T_{vj} = 175 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		160		
Diode reverse recovery charge	Q_{rr}	V_R = 800 V	T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		1.8		µC
			T_{vj} = 25 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		1.25		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		3.65		
			T_{vj} = 175 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		2.65		

(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 = 60 A, $-di_F/dt$ = 1000 A/µs		22		A
			T_{vj} = 25 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		20		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		34		
			T_{vj} = 175 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		32		
Diode peak rate of fall of reverse recovery current	di_{rr}/dt	V_R = 800 V	T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		140		A/µs
			T_{vj} = 25 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		190		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		190		
			T_{vj} = 175 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		255		
Reverse recovery energy	E_{rec}	V_R = 800 V	T_{vj} = 25 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		0.6		mJ
			T_{vj} = 25 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		0.4		
			T_{vj} = 175 °C, I_F = 60 A, $-di_F/dt$ = 1000 A/µs		1.25		
			T_{vj} = 175 °C, I_F = 30 A, $-di_F/dt$ = 1000 A/µs		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°C, unless otherwise specified.

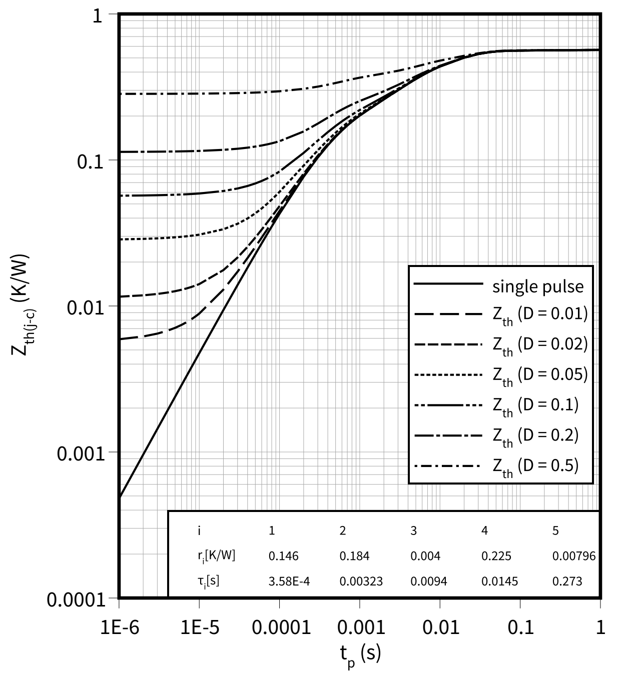
Dynamic test circuit, parasitic inductance L_{σ} = 27 nH, parasitic capacitor C_{σ} = 12 pF from Fig. E, IKY75N120CH7 was used as IGBT.

3 Characteristics diagrams

Diode transient thermal impedance as a function of pulse width

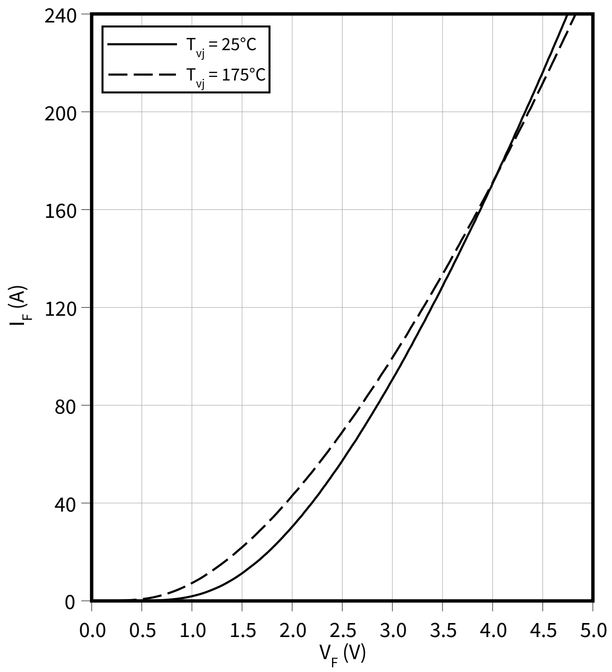
$Z_{th(j-c)} = f(t_p)$

$D = t_p/T$



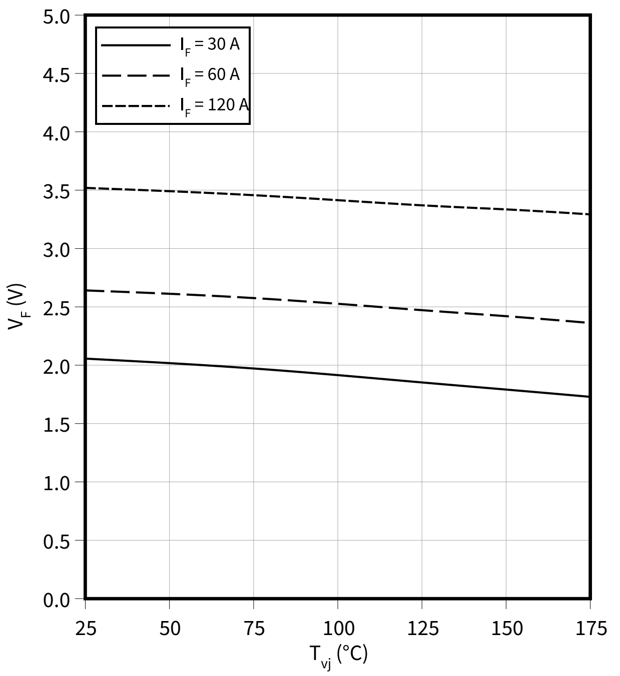
Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



Typical diode forward voltage as a function of junction temperature

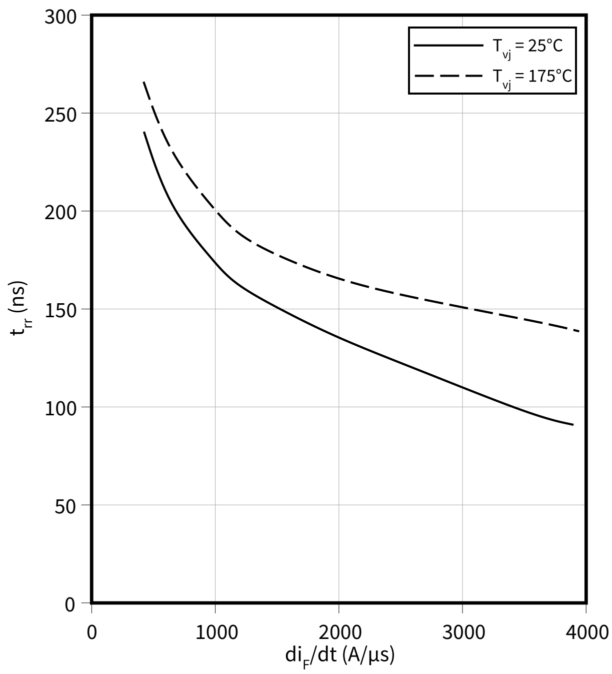
$V_F = f(T_{vj})$



Typical reverse recovery time as a function of diode current slope

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

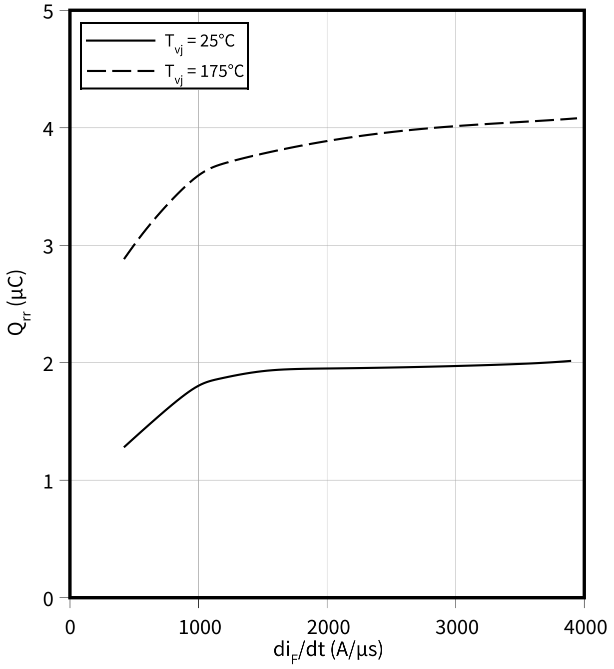
$V_R = 800$ V, $I_F = 60$ A



Typical reverse recovery charge as a function of diode current slope

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

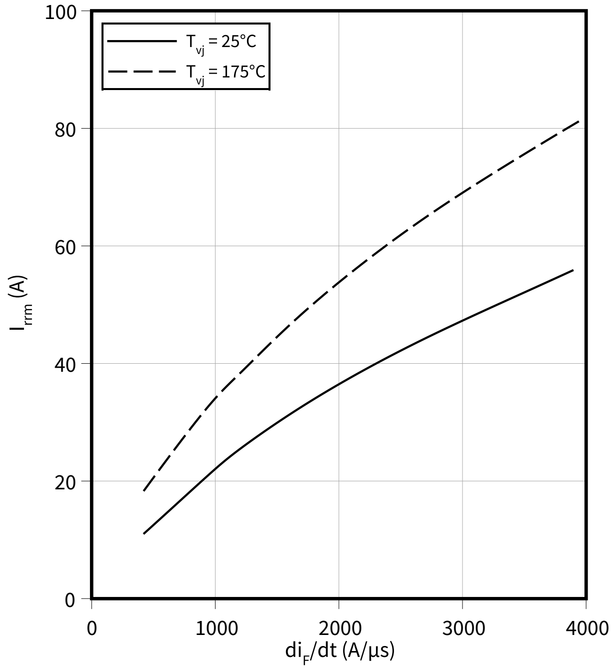
$V_R = 800\ V$, $I_F = 60\ A$



Typical reverse recovery current as a function of diode current slope

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

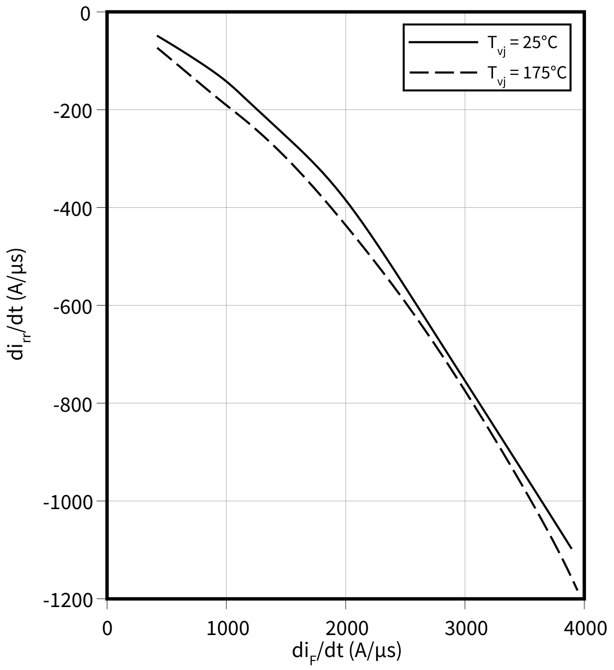
$V_R = 800\ V$, $I_F = 60\ A$



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

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

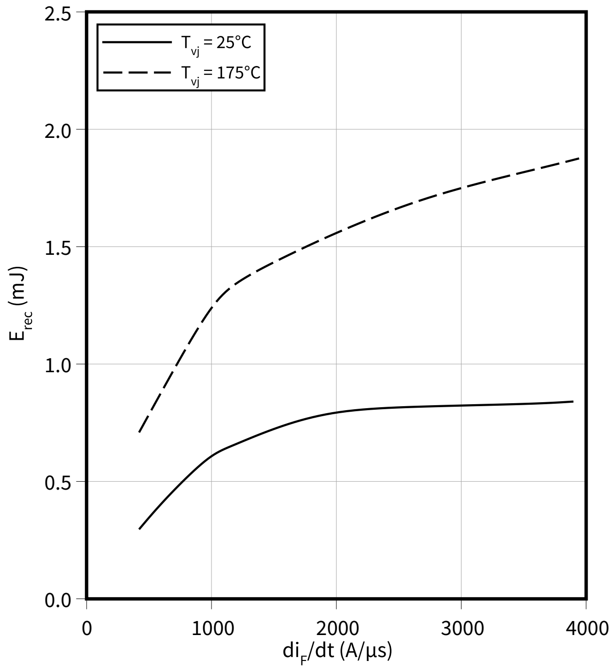
$V_R = 800\ V$, $I_F = 60\ A$



Typical reverse energy losses as a function of diode current slope

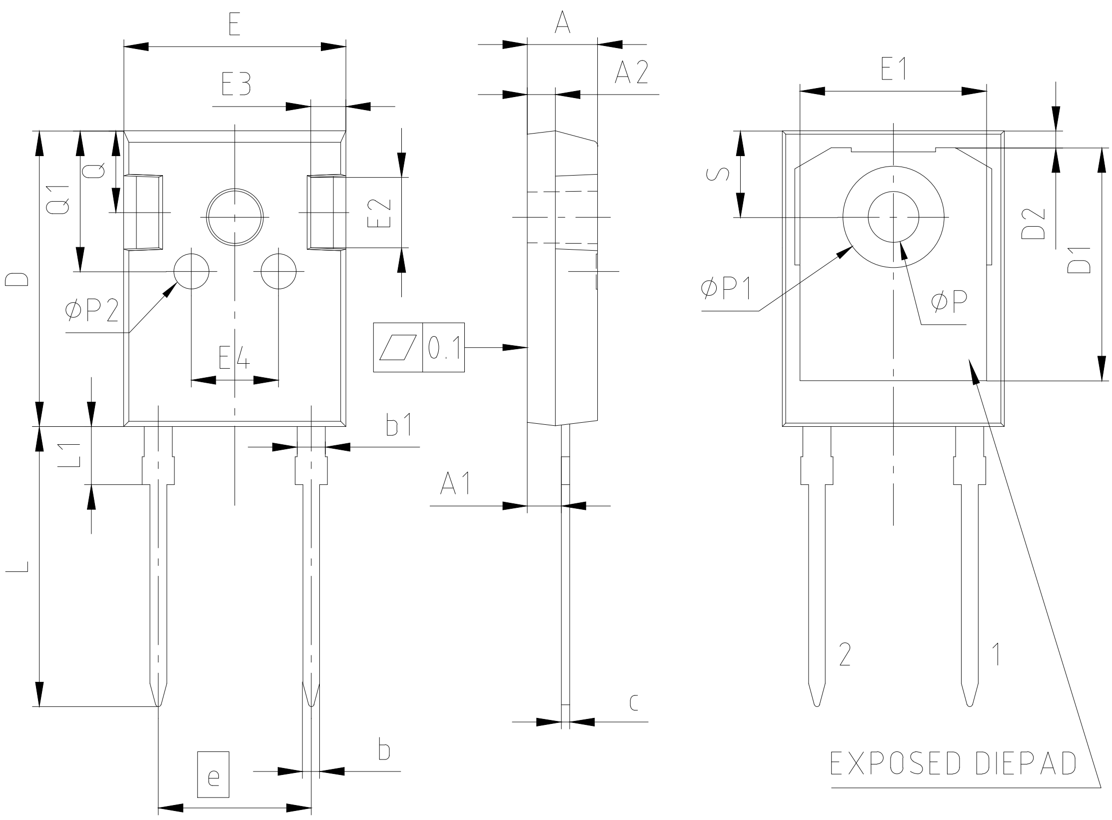
$E_{rec} = f(di_F/dt)$

$V_R = 800\ V$, $I_F = 60\ A$



4 Package outlines

PG-TO247-2-STD-NA8.8



PACKAGE - GROUP NUMBER:	PG-TO247-2-U01				
DIMENSIONS	**MILLIMETERS**		**DIMENSIONS**	**MILLIMETERS**	
	MIN.	MAX.		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

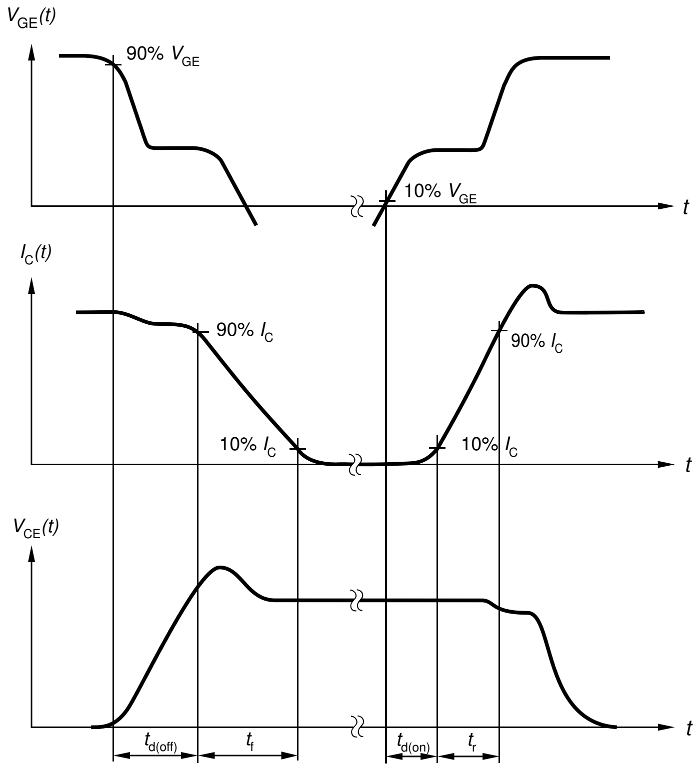


Figure A. **Definition of switching times**

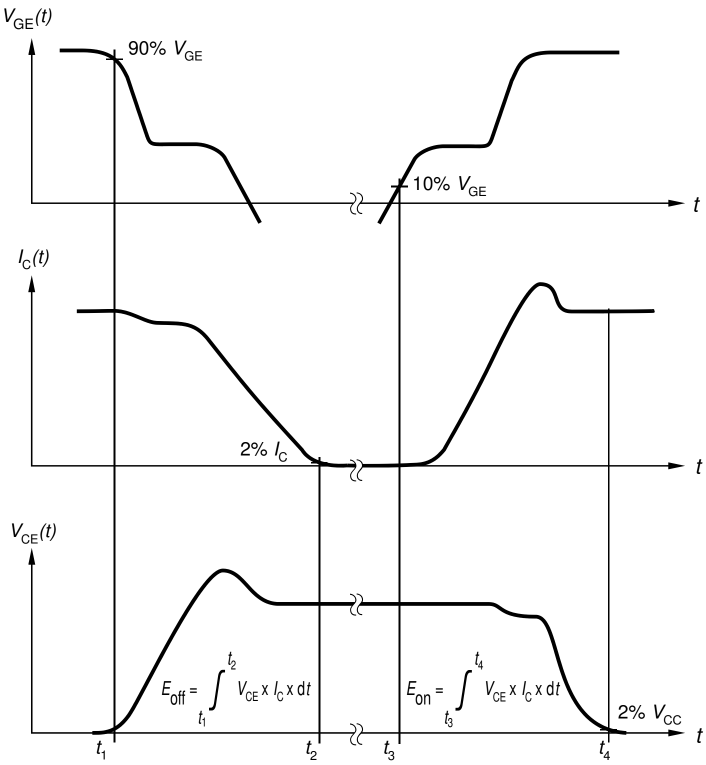


Figure B. **Definition of switching losses**

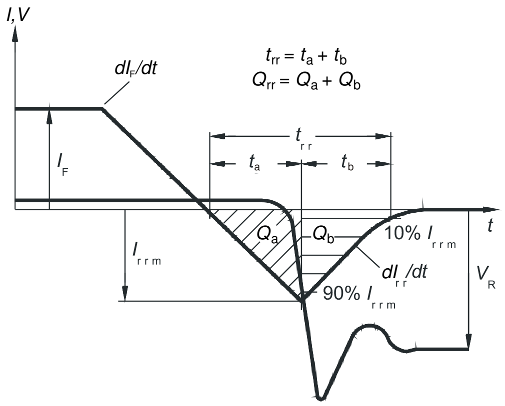


Figure C. **Definition of diode switching characteristics**

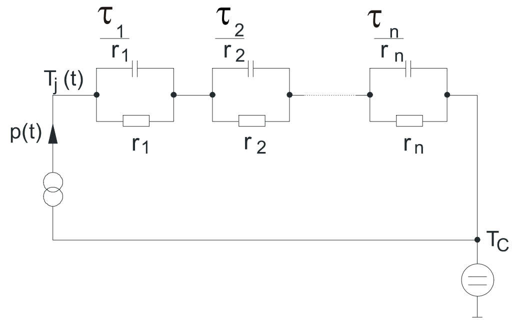


Figure D. **Thermal equivalent circuit**

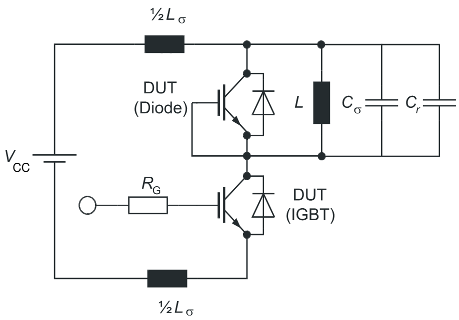


Figure E. **Dynamic test circuit**
Parasitic inductance L_σ,
parasitic capacitor C_σ,
relief capacitor C_r,
(only for ZVT switching)

Figure 2

Revision history

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

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