Final datasheet

The Soft 650 V Emitter Controlled Si Diode 7 offers improved reliability for both Industrial and Home Appliance applications

Features

- V_{RRM} = 650 V
- I_F = 75 A
- Low and temperature stable forward voltage (V_F)
- Very soft and fast recovery
- Low reverse recovery current (I_{rrm})
- Humidity robust design
- Cosmic ray ruggedness
- Maximum junction temperature T_{vjmax} = 175°C
- Qualified according to JEDEC for target applications
- Pb-free lead plating; RoHS compliant
- Complete product spectrum and PSpice Models: http://www.infineon.com/ec7/

Green
Halogen-free
Lead-free
RoHS

Potential applications

- String and micro inverter
- Datacenter UPS
- Offline UPS/Residential UPS
- Online UPS/Industrial UPS
- Residential aircon
- Welding

Product validation

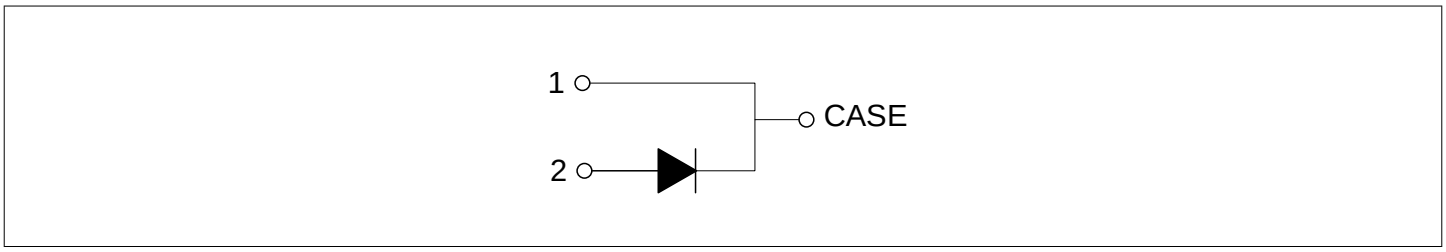
- Qualified for industrial applications according to the relevant tests of JEDEC47/20/22

Description

Pin definition:

• Pin 1 and backside - Cathode

• Pin 2 - Anode



Type	Package	Marking
IDWD75E65E7	PG-TO247-2-STD-NA8.8	E75EE7

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	$R_{th(j-c)}$				0.58	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		650	V
Diode forward current, limited by T_{vjmax}	I_F	limited by bondwire	$T_c = 25$ °C	100	A
			$T_c = 100$ °C	84	
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpulse}			300	A
Diode surge non repetitive forward current, sine halfwave	I_{FSM}	$t_p = 10$ ms	$T_c = 25$ °C	300	A
Power dissipation	P_{tot}		$T_c = 25$ °C	258	W
			$T_c = 100$ °C	129	

Table 3 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Diode forward voltage	V_F	$I_F = 75$ A	$T_{vj} = 25$ °C		1.65	2.1	V
			$T_{vj} = 125$ °C		1.6		
			$T_{vj} = 175$ °C		1.55		

(table continues...)

Table 3 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Reverse leakage current	I_R	V_R = 650 V	T_{vj} = 25 °C			20	µA
			T_{vj} = 175 °C		589		
Diode reverse recovery time	t_{rr}	V_R = 400 V	T_{vj} = 25 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		97		ns
			T_{vj} = 25 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		76.2		
			T_{vj} = 175 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		157		
			T_{vj} = 175 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		122		
Diode reverse recovery charge	Q_{rr}	V_R = 400 V	T_{vj} = 25 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		1.3		µC
			T_{vj} = 25 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		0.93		
			T_{vj} = 175 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		3.9		
			T_{vj} = 175 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		2.96		
Diode peak reverse recovery current	I_{rrm}	V_R = 400 V	T_{vj} = 25 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		21.3		A
			T_{vj} = 25 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		18.2		
			T_{vj} = 175 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		37.7		
			T_{vj} = 175 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		34.8		

(table continues...)

Table 3 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Diode peak rate of fall of reverse recovery current	di_{rr}/dt	V_R = 400 V	T_{vj} = 25 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		764		A/µs
			T_{vj} = 25 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		989		
			T_{vj} = 175 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		794		
			T_{vj} = 175 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		1100		
Reverse recovery energy	E_{rec}	V_R = 400 V	T_{vj} = 25 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		0.19		mJ
			T_{vj} = 25 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		0.14		
			T_{vj} = 175 °C, I_F = 75 A, $-di_F/dt$ = 1000 A/µs		0.68		
			T_{vj} = 175 °C, I_F = 37.5 A, $-di_F/dt$ = 1000 A/µs		0.52		
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.

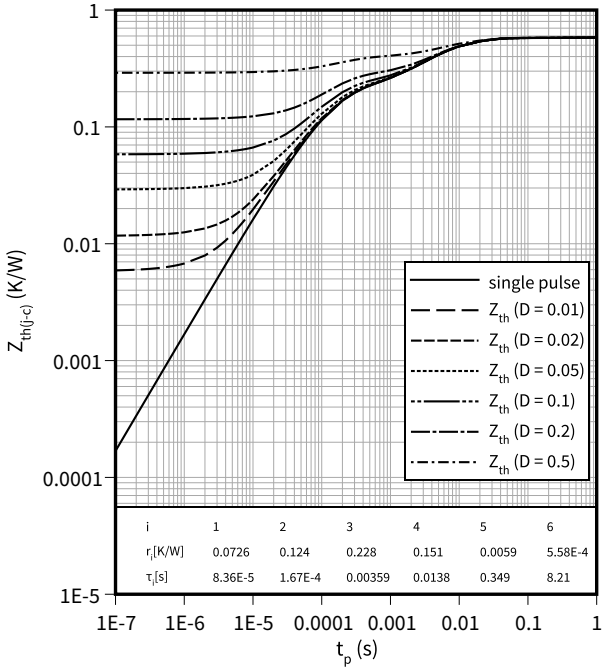
Electrical Characteristic at T_{vj} = 25°C, unless otherwise specified.

Dynamic test circuit, parasitic inductance L_σ = 30 nH, parasitic capacitor C_σ = 18 pF from Fig. E.

3 Characteristics diagrams

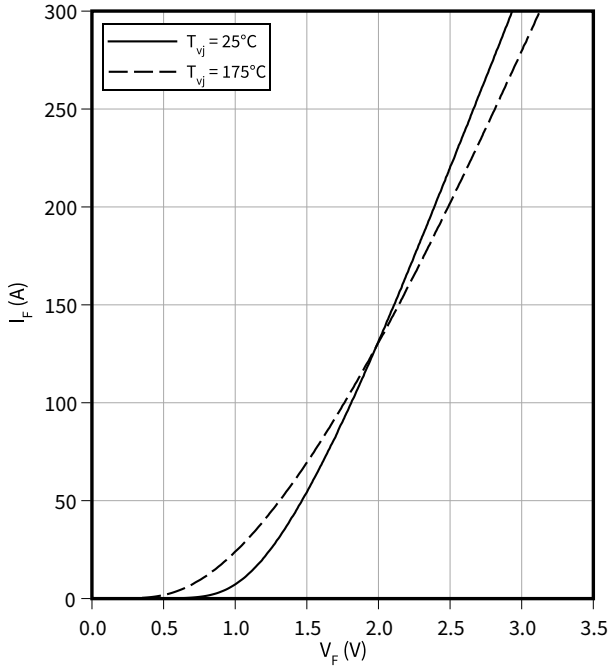
Diode transient thermal impedance as a function of pulse width

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



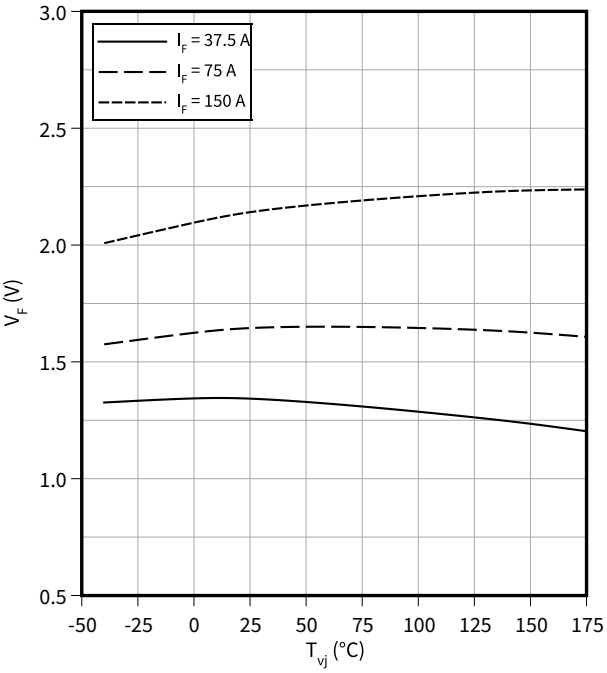
Typical diode forward current as a function of forward voltage

$I_F = f(V_F)$



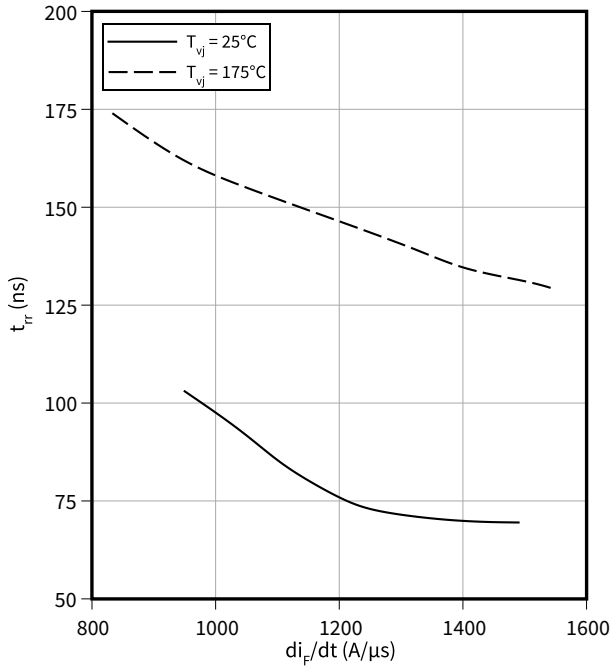
Typical diode forward voltage as a function of junction temperature

$V_F = f(T_{vj})$



Typical reverse recovery time as a function of diode current slope

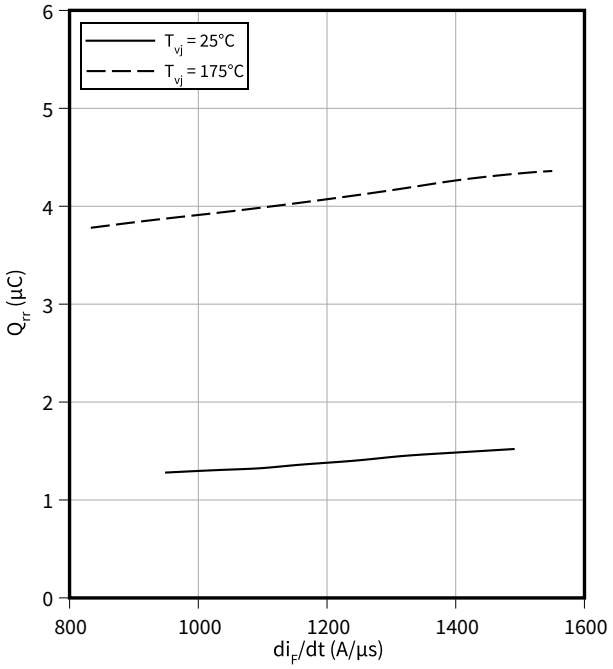
$t_{rr} = f(di_F/dt)$
V_R = 400 V, I_F = 75 A



Typical reverse recovery charge as a function of diode current slope

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

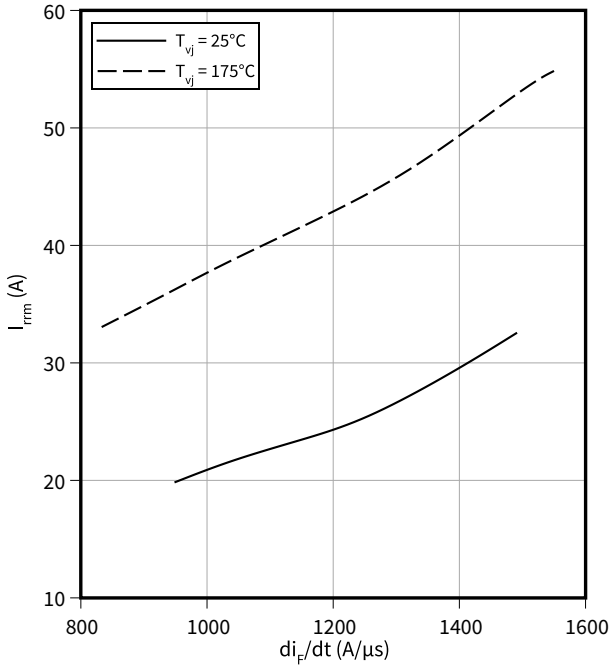
$V_R = 400\ V$, $I_F = 75\ A$



Typical reverse recovery current as a function of diode current slope

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

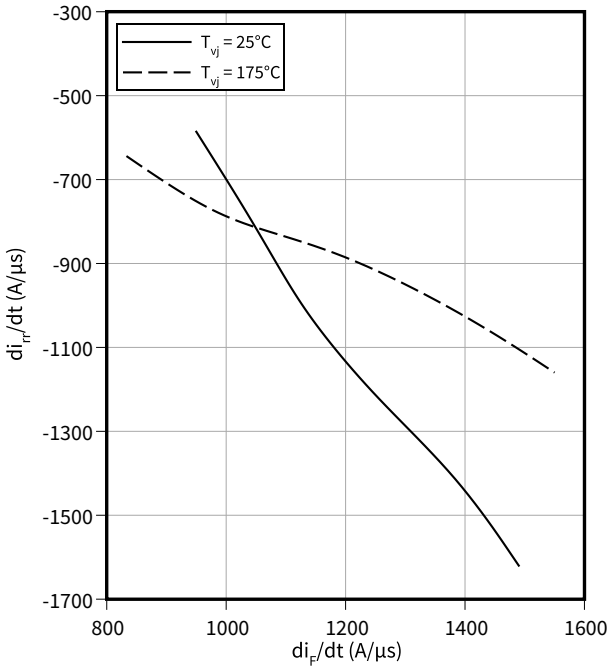
$V_R = 400\ V$, $I_F = 75\ A$



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

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

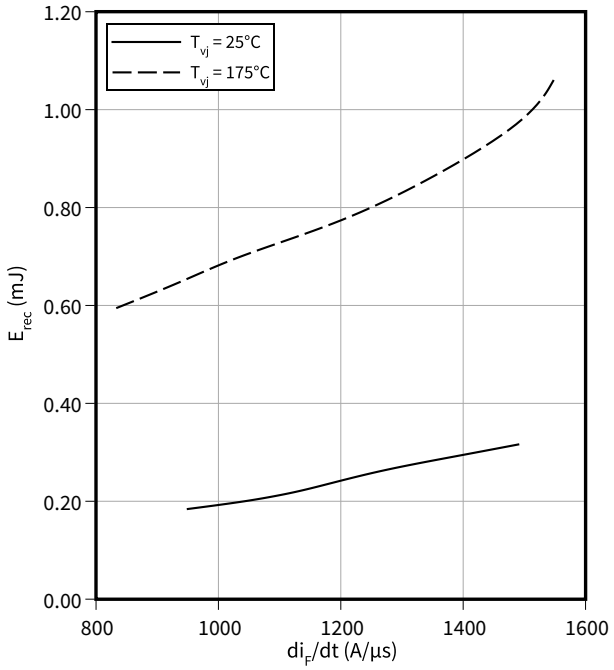
$V_R = 400\ V$, $I_F = 75\ A$



Typical reverse energy losses as a function of diode current slope

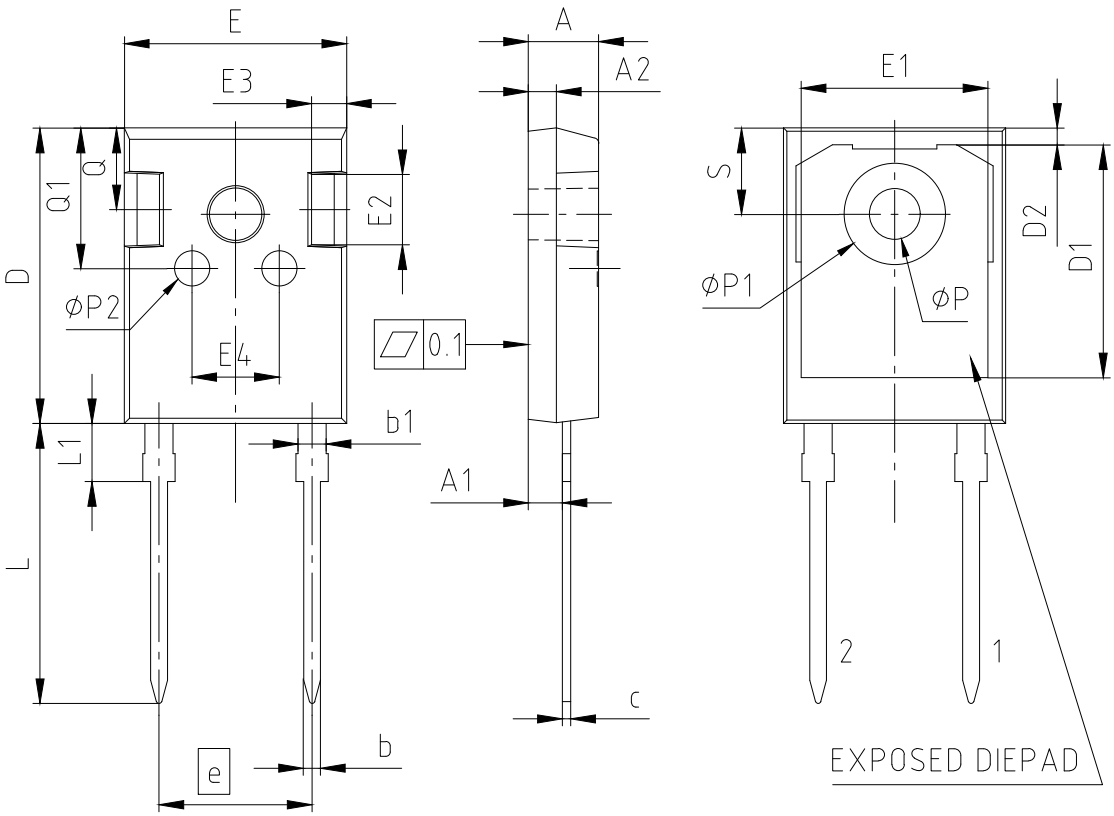
$E_{rec} = f(di_F/dt)$

$V_R = 400\ V$, $I_F = 75\ A$



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

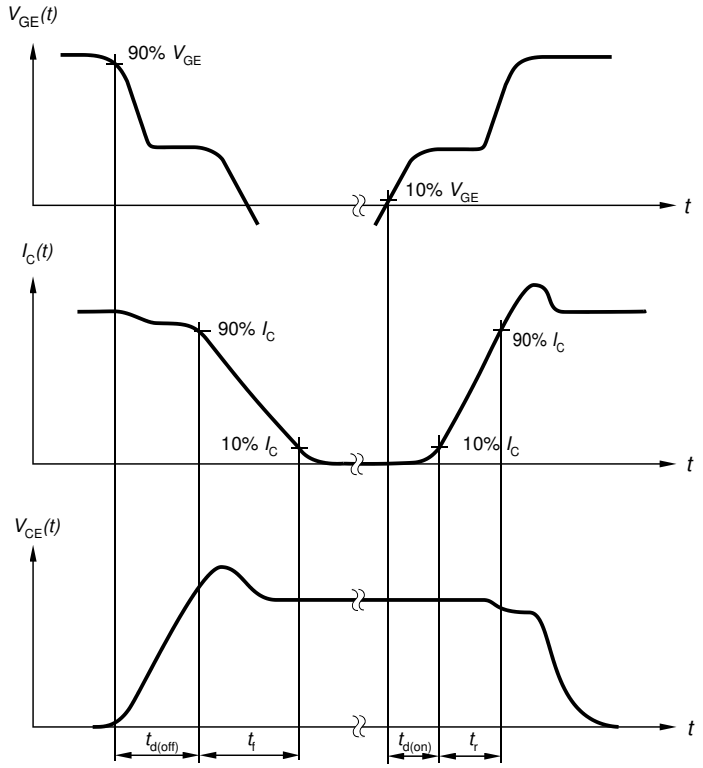


Figure A. **Definition of switching times**

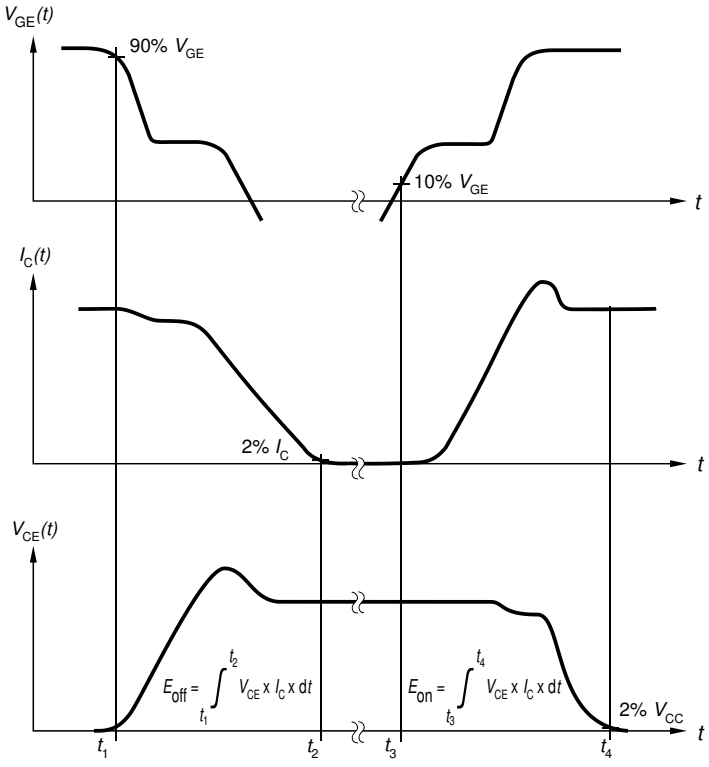


Figure B. **Definition of switching losses**

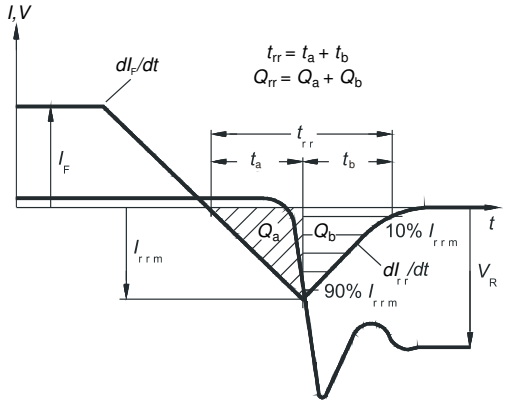


Figure C. **Definition of diode switching characteristics**

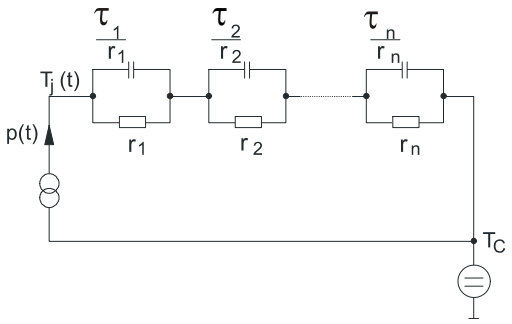


Figure D. **Thermal equivalent circuit**

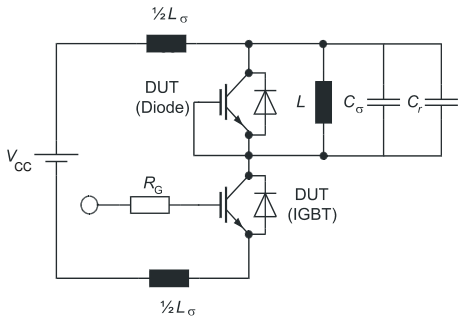


Figure E. **Dynamic test circuit**
Parasitic inductance L_σ,
parasitic capacitor C_σ,
relief capacitor C_r,
(only for ZVT switching)

Figure 2

Revision history

Document revision	Date of release	Description of changes
0.10	2023-04-26	Preliminary datasheet
1.00	2023-05-02	Final datasheet
1.10	2023-11-06	Update of diode forward current I_F Update of graph on page 6

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