Diode

Rapid Switching Emitter Controlled Diode

IDP20C65D2

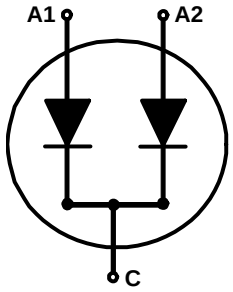
Emitter Controlled Diode Rapid 2 Common Cathode Series

Data sheet

Industrial Power Control

Rapid Switching Emitter Controlled Diode

Features:



- Qualified according to JEDEC for target applications
- 650 V Emitter Controlled technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage and stable over temperature
- 175 °C junction operating temperature
- Easy paralleling
- Pb-free lead plating; RoHS compliant

Applications:

- Boost diode in CCM PFC

Package pin definition:

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

Green

Halogen-Free

RoHS

Key Performance and Package Parameters

Type	V_{rrm}	I_f	V_f, T_{vj}=25°C	T_{vjmax}	Marking	Package
IDP20C65D2	650V	2x 10A	1.6V	175°C	C20ED2	PG-TO220-3

Table of Contents

Maximum Ratings (electrical parameters per diode)

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

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage, $T_{vj} \geq 25°C$	V_{RRM}	650	V
Diode forward current, limited by T_{vjmax} T_C = 25°C T_C = 100°C	I_F	 20.0 10.0	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	30.0	A
Diode surge non repetitive forward current T_C = 25°C, t_p = 8.3ms, sine halfwave	I_{FSM}	 60.0	A
Power dissipation T_C = 25°C	P_{tot}	68.0	W
Operating junction temperature	T_{vj}	-40...+175	°C
Storage temperature	T_{stg}	-55...+150	°C
Soldering temperature, wave soldering 1.6 mm (0.063 in.) from case for 10s		 260	°C
Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm

Thermal Resistances (per diode)

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
Diode thermal resistance,[1)] junction - case	$R_{th(j-c)}$		2.20	K/W
Thermal resistance junction - ambient	$R_{th(j-a)}$		62	K/W

Electrical Characteristics (per diode), at T_{vj} = 25°C, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Diode forward voltage	V_F	I_F = 10.0A T_{vj} = 25°C T_{vj} = 175°C	 - -	 1.60 1.65	 2.20 -	V
Reverse leakage current[2)]	I_R	V_R = 650V T_{vj} = 25°C T_{vj} = 175°C	 - -	 4.0 250.0	 40.0 -	µA

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristic						
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	7.0	-	nH

[1)] Please be aware that in non standard load conditions, due to high Rth(j-c), Tvj close to Tvjmax can be reached.
[2)] Reverse leakage current per diode specified for operating conditions with zero voltage applied to the other diode.

Switching Characteristics (per diode), Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Diode Characteristic, at T_{vj} = 25°C						
Diode reverse recovery time	t_{rr}	T_{vj} = 25°C, V_R = 400V, I_F = 10.0A, di_F/dt = 1000A/µs, Lσ = 30nH, Cσ = 40pF, switch IKW50N65H5	-	28	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.16	-	µC
Diode peak reverse recovery current	I_{rrm}		-	8.6	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-740	-	A/µs
Diode reverse recovery time	t_{rr}	T_{vj} = 25°C, V_R = 400V, I_F = 10.0A, di_F/dt = 350A/µs, Lσ = 30nH, Cσ = 40pF, switch IKW50N65H5	-	50	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.13	-	µC
Diode peak reverse recovery current	I_{rrm}		-	4.3	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-130	-	A/µs

Switching Characteristics (per diode), Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Diode Characteristic, at T_{vj} = 175°C/125°C						
Diode reverse recovery time	t_{rr}	T_{vj} = 175°C, V_R = 400V, I_F = 10.0A, di_F/dt = 1000A/µs, Lσ = 30nH, Cσ = 40pF, switch IKW50N65H5	-	35	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.23	-	µC
Diode peak reverse recovery current	I_{rrm}		-	11.3	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-730	-	A/µs
Diode reverse recovery time	t_{rr}	T_{vj} = 125°C, V_R = 400V, I_F = 10.0A, di_F/dt = 350A/µs, Lσ = 30nH, Cσ = 40pF, switch IKW50N65H5	-	54	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.18	-	µC
Diode peak reverse recovery current	I_{rrm}		-	5.0	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-190	-	A/µs

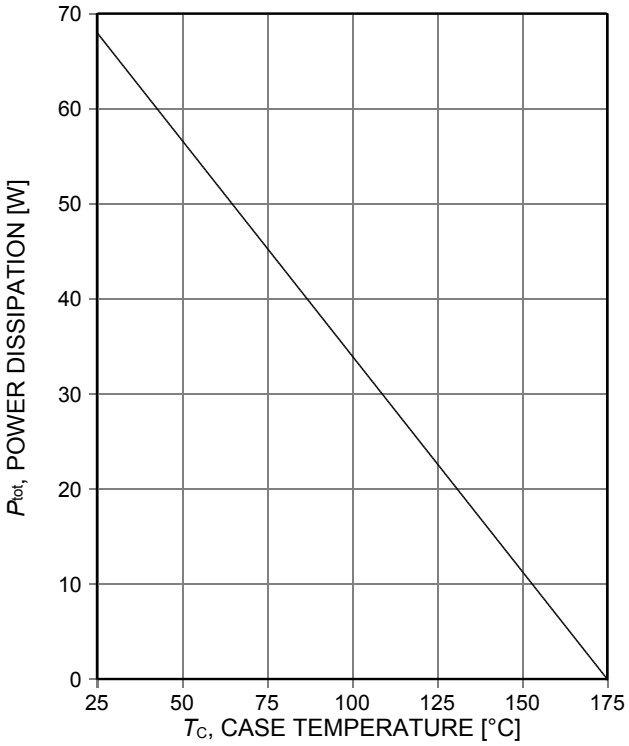


Figure 1. **Power dissipation per diode as a function of case temperature**
(T_{vj}≤175°C)

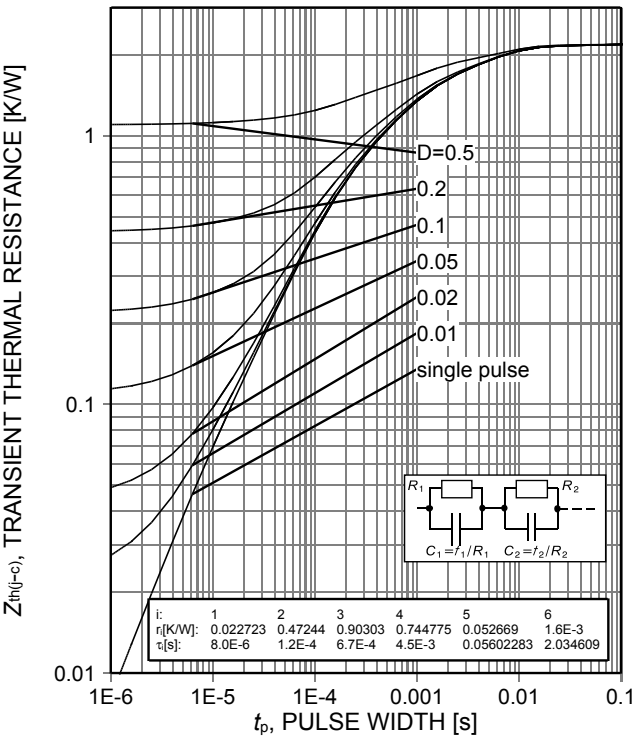


Figure 2. **Diode transient thermal impedance per diode as a function of pulse width**
($D=t_p/T$)

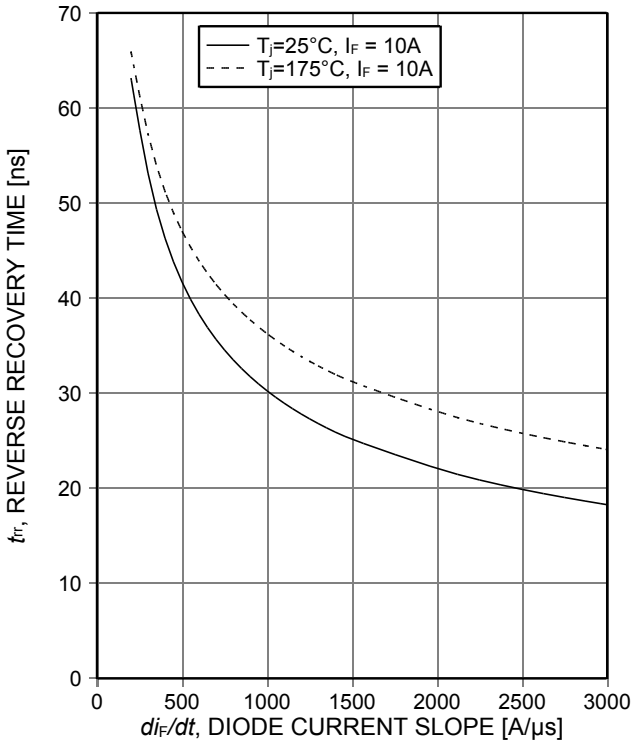


Figure 3. **Typical reverse recovery time as a function of diode current slope**
(V_R=400V)

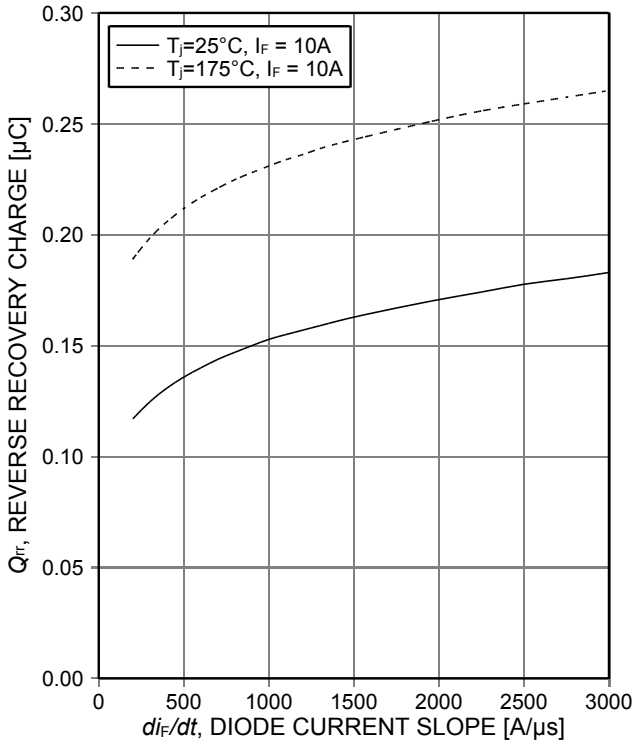


Figure 4. **Typical reverse recovery charge per diode as a function of diode current slope**
(V_R=400V)

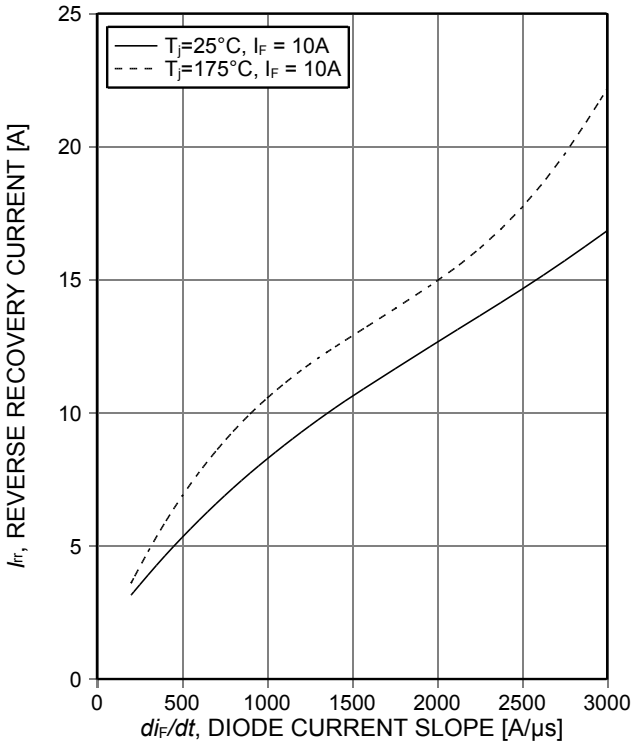


Figure 5. **Typical reverse recovery current per diode as a function of diode current slope**
(V_R=400V)

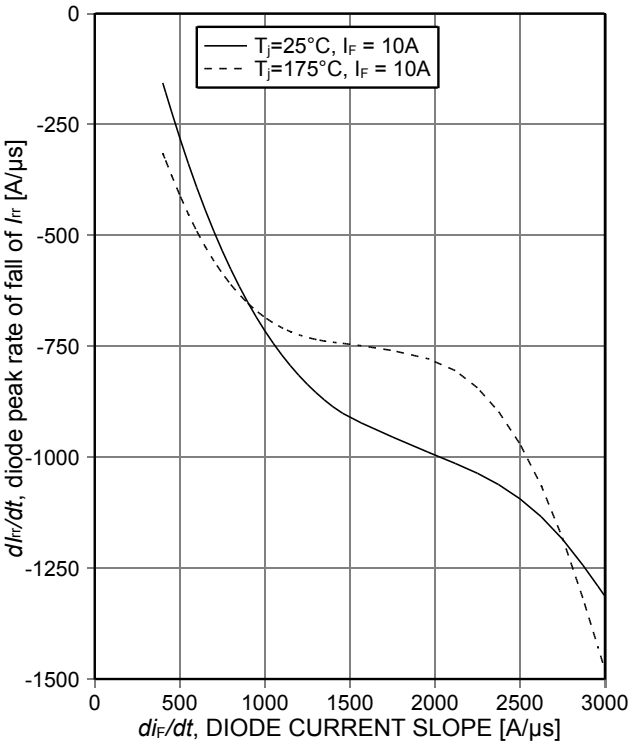


Figure 6. **Typical diode peak rate of fall of rev. rec. current per diode as a function of diode current slope**
(V_R=400V)

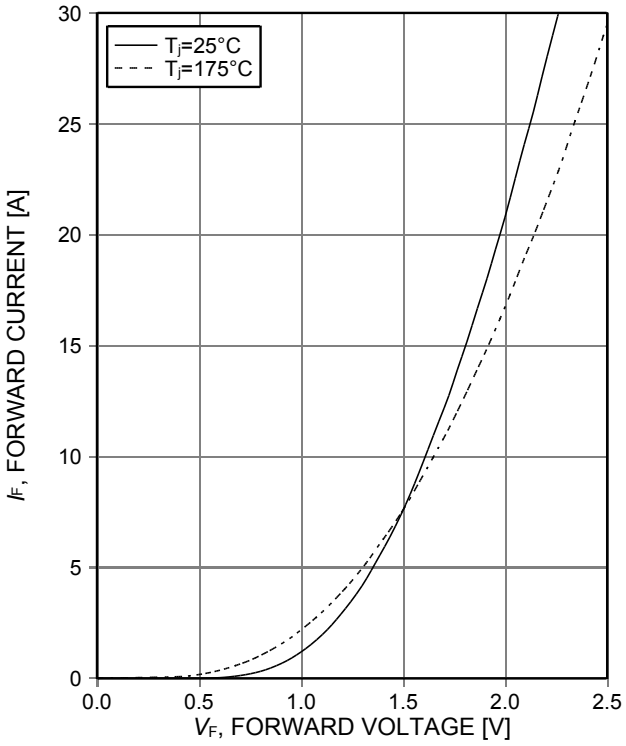


Figure 7. **Typical diode forward current per diode as a function of forward voltage**

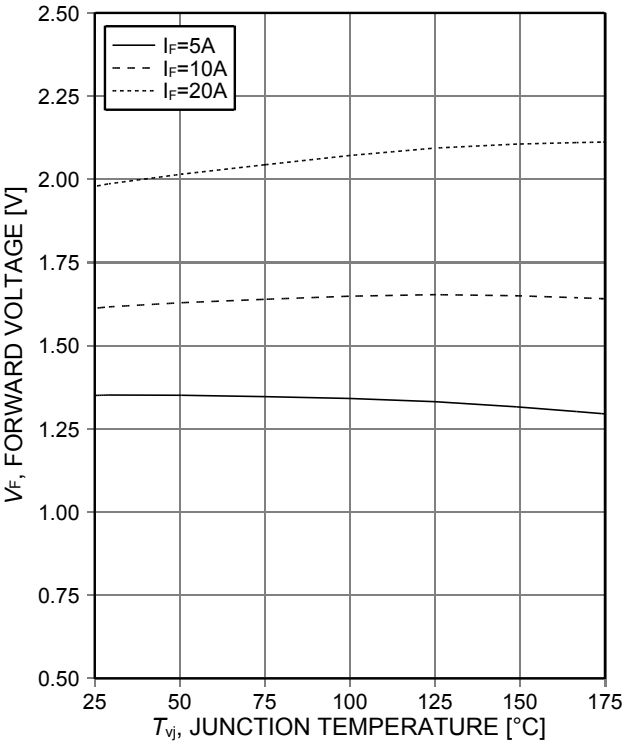
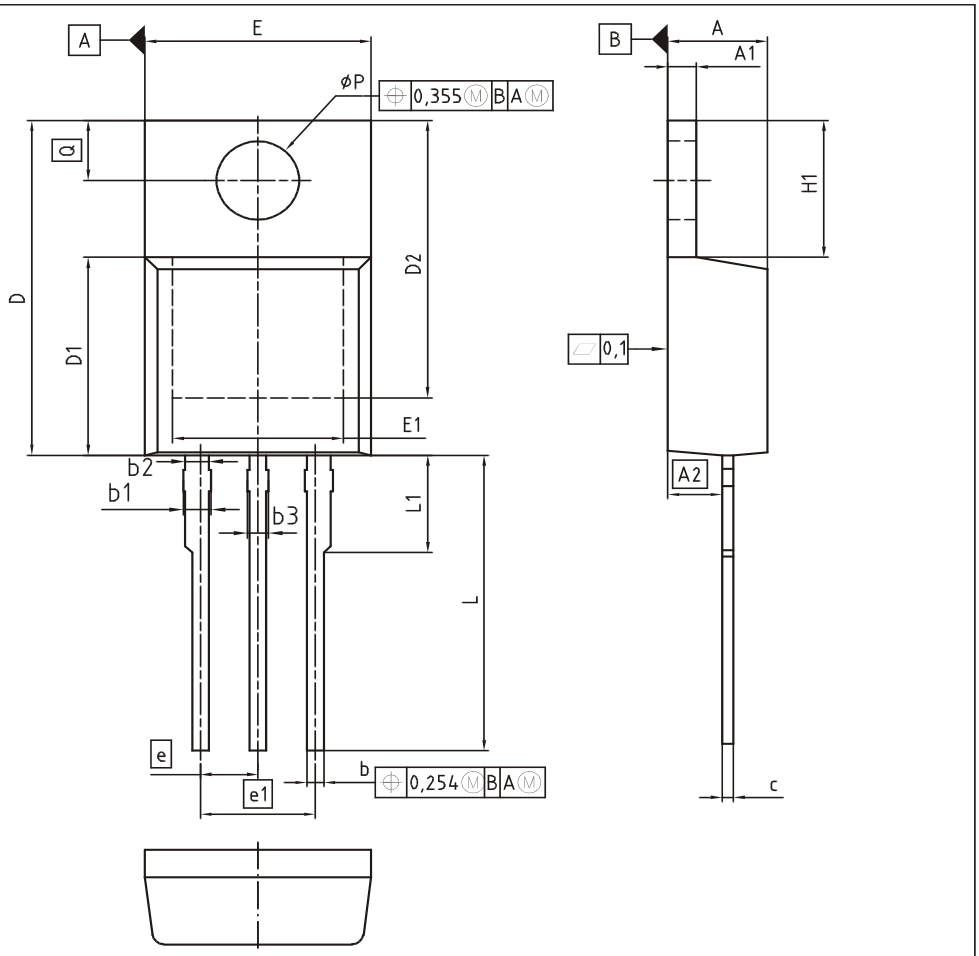


Figure 8. **Typical diode forward voltage as a function of junction temperature**

PG-TO220-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.30	4.57	0.169	0.180
A1	1.17	1.40	0.046	0.055
A2	2.15	2.72	0.085	0.107
b	0.65	0.86	0.026	0.034
b1	0.95	1.40	0.037	0.055
b2	0.95	1.15	0.037	0.045
b3	0.65	1.15	0.026	0.045
c	0.33	0.60	0.013	0.024
D	14.81	15.95	0.583	0.628
D1	8.51	9.45	0.335	0.372
D2	12.19	13.10	0.480	0.516
E	9.70	10.36	0.382	0.408
E1	6.50	8.60	0.256	0.339
e	2.54		0.100	
e1	5.08		0.200	
N	3		3	
H1	5.90	6.90	0.232	0.272
L	13.00	14.00	0.512	0.551
L1	-	4.80	-	0.189
øP	3.60	3.89	0.142	0.153
Q	2.60	3.00	0.102	0.118

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Z8B00003318

SCALE 0 2.5 0 2.5 5mm

EUROPEAN PROJECTION

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REVISION
06

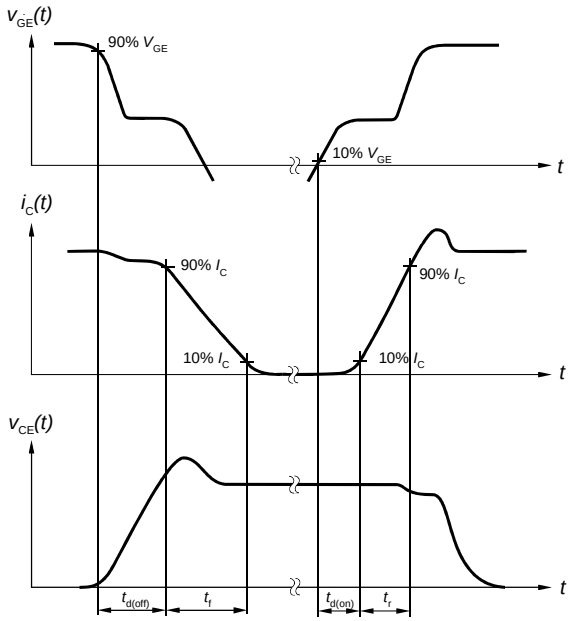

Figure A. Definition of switching times

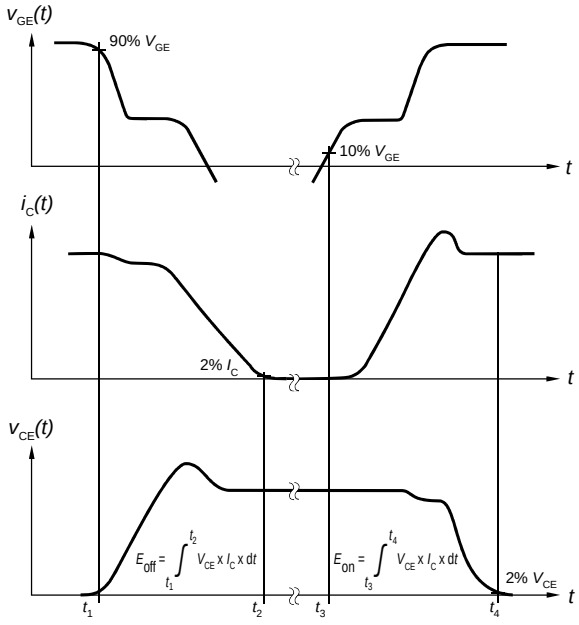

Figure B. Definition of switching losses

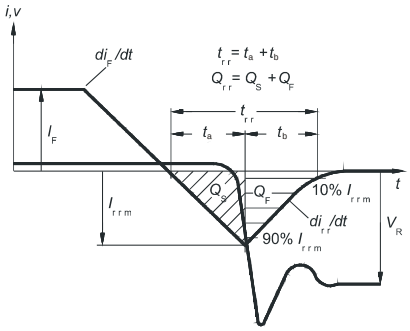

Figure C. Definition of diodes switching characteristics

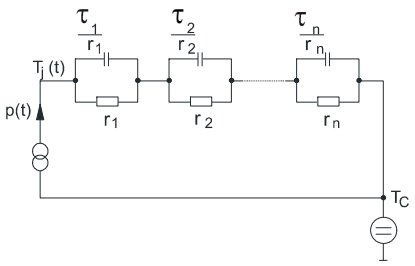

Figure D. Thermal equivalent circuit

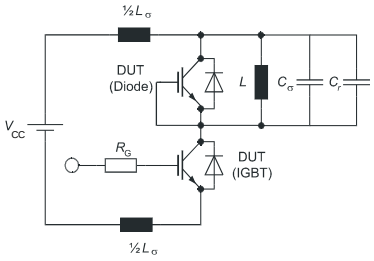

Figure E. Dynamic test circuit
Parasitic inductance L_σ,
Parasitic capacitor C_σ,
Relief capacitor C_r,
(only for ZVT switching)

Revision History

IDP20C65D2

Revision: 2014-09-18, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
2.1	2014-09-18	Final data sheet

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