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Diode

Rapid Switching Emitter Controlled Diode

IDW20C65D2

Emitter Controlled Diode Rapid 2 Common Cathode Series

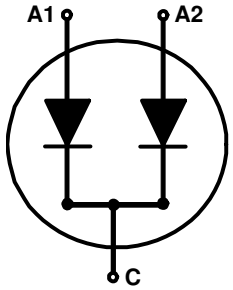
Data sheet

Industrial Power Control

Rapid Switching Emitter Controlled Diode

Features:

- Qualified according to JEDEC for target applications
- 650V Emitter Controlled technology
- Fast recovery
- Soft switching
- Low reverse recovery charge (Q_{rr})
- Low forward voltage (V_F) 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
IDW20C65D2	650V	2x 10A	1.6V	175°C	C20ED2	PG-TO247-3

Table of Contents

Maximum Ratings (per leg)

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 Power dissipation T_C = 100°C	P_{tot}	68.0 34.0	W
Operating junction temperature	T_{vj}	-40...+175	°C
Storage temperature	T_{stg}	-55...+150	°C
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s		 260	°C
Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm

Thermal Resistances (per leg)

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	$R_{th(j-a)}$		40	K/W

Electrical Characteristics (per leg), 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} = 125°C T_{vj} = 175°C	 - - -	 1.60 1.65 1.65	 2.20 - -	V
Reverse leakage current[2]	I_R	V_R = 650V T_{vj} = 25°C T_{vj} = 175°C	 - -	 - 400.0	 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		-	13.0	-	nH

[1] Please be aware that in nonstandard load conditions, due to high $R_{th(j-c)}$, T_{vj} close to T_{vjmax} can be reached.
[2] Reverse leakage current per leg specified for operating conditions with zero voltage applied to the other leg.

Switching Characteristics (per leg), 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, $L\sigma$ = 30nH, $C\sigma$ = 40pF, switch IGW50N65H5.	-	30	-	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, $L\sigma$ = 30nH, $C\sigma$ = 40pF, switch IGW50N65H5.	-	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 leg), 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, $L\sigma$ = 30nH, $C\sigma$ = 40pF, switch IGW50N65H5.	-	36	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.23	-	µC
Diode peak reverse recovery current	I_{rrm}		-	10.6	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-680	-	A/µs
Diode reverse recovery time	t_{rr}	T_{vj} = 125°C, V_R = 400V, I_F = 10.0A, di_F/dt = 350A/µs, $L\sigma$ = 30nH, $C\sigma$ = 40pF, switch IGW50N65H5.	-	54	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.16	-	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

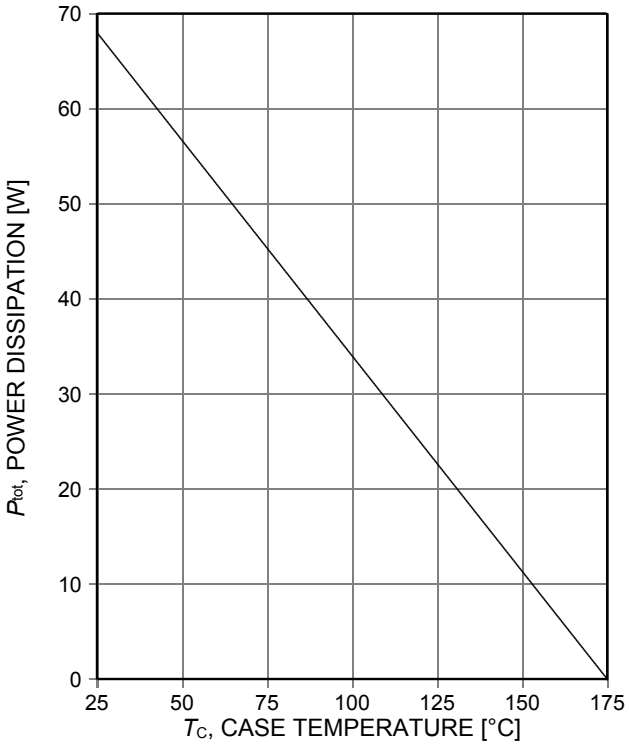


Figure 1. **Power dissipation per leg as a function of case temperature**
(T_{vj}≤175°C)

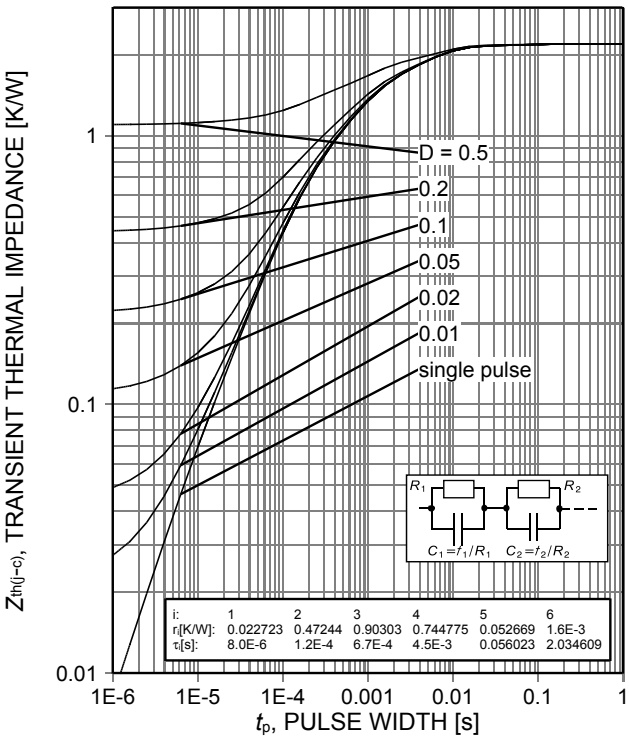


Figure 2. **Diode transient thermal impedance per leg as a function of pulse width**
($D=t_p/T$)

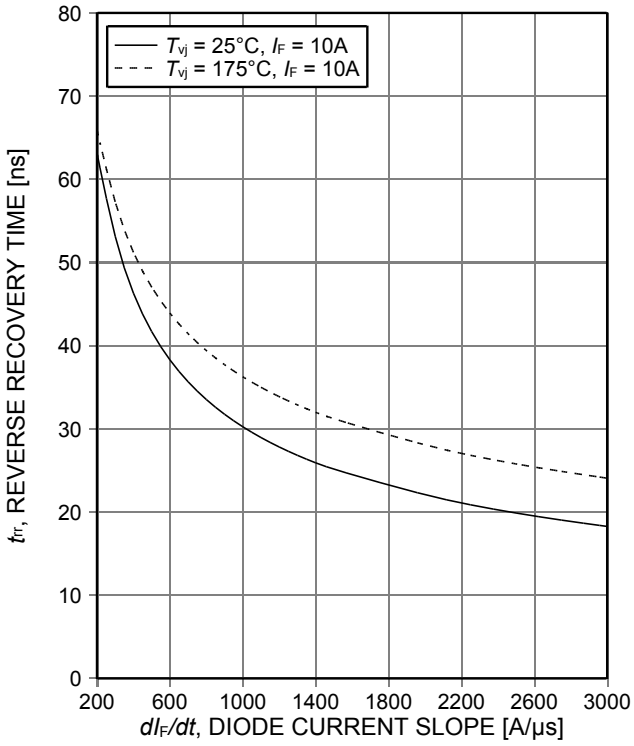


Figure 3. **Typical reverse recovery time per leg as a function of diode current slope**
(V_R=400V)

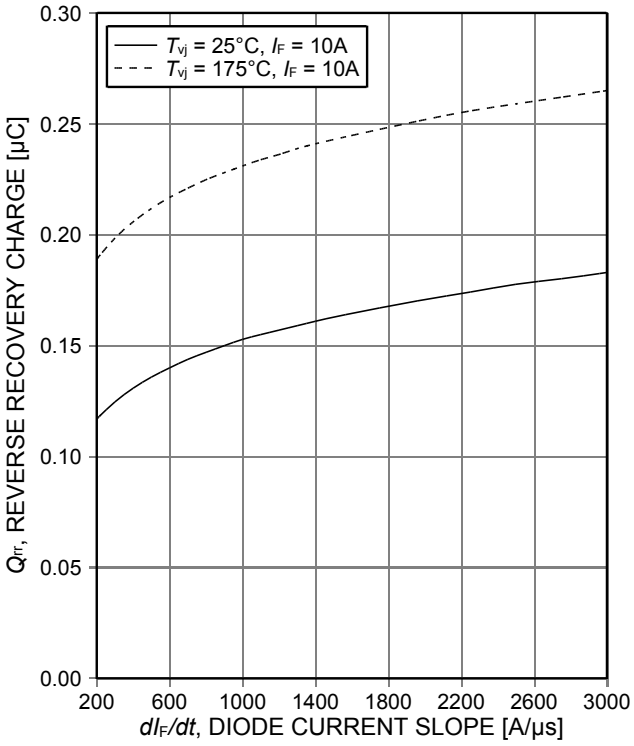


Figure 4. **Typical reverse recovery charge per leg as a function of diode current slope**
(V_R=400V)

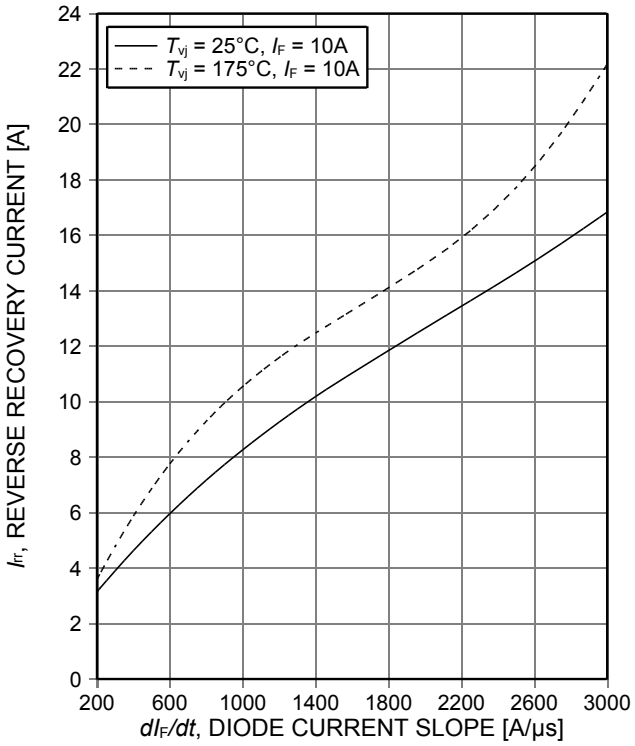


Figure 5. **Typical reverse recovery current per leg as a function of diode current slope**
(V_R=400V)

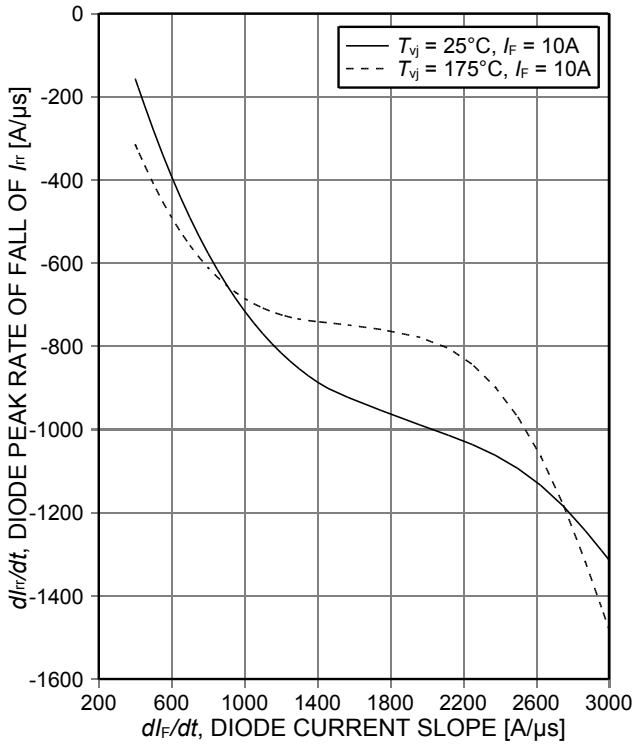


Figure 6. **Typical diode peak rate of fall of rev. rec. current per leg as a function of diode current slope**
(V_R=400V)

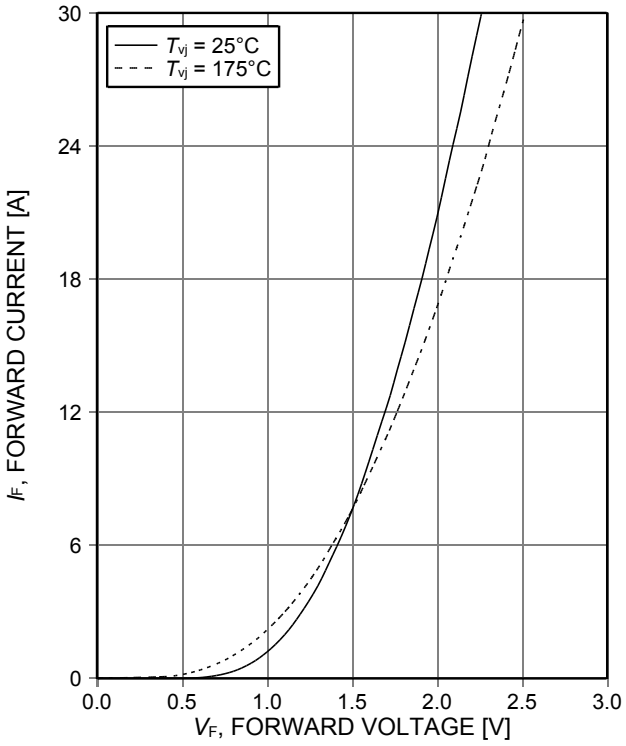


Figure 7. **Typical diode forward current per leg as a function of forward voltage**

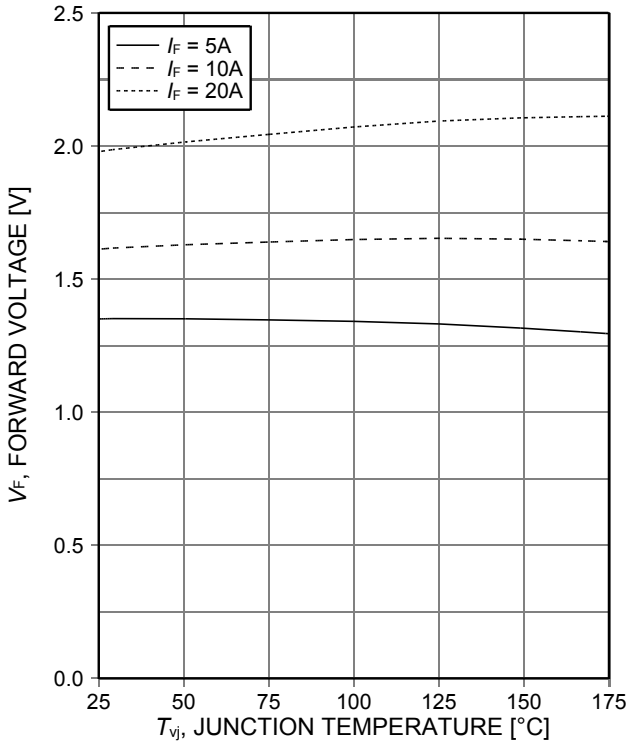
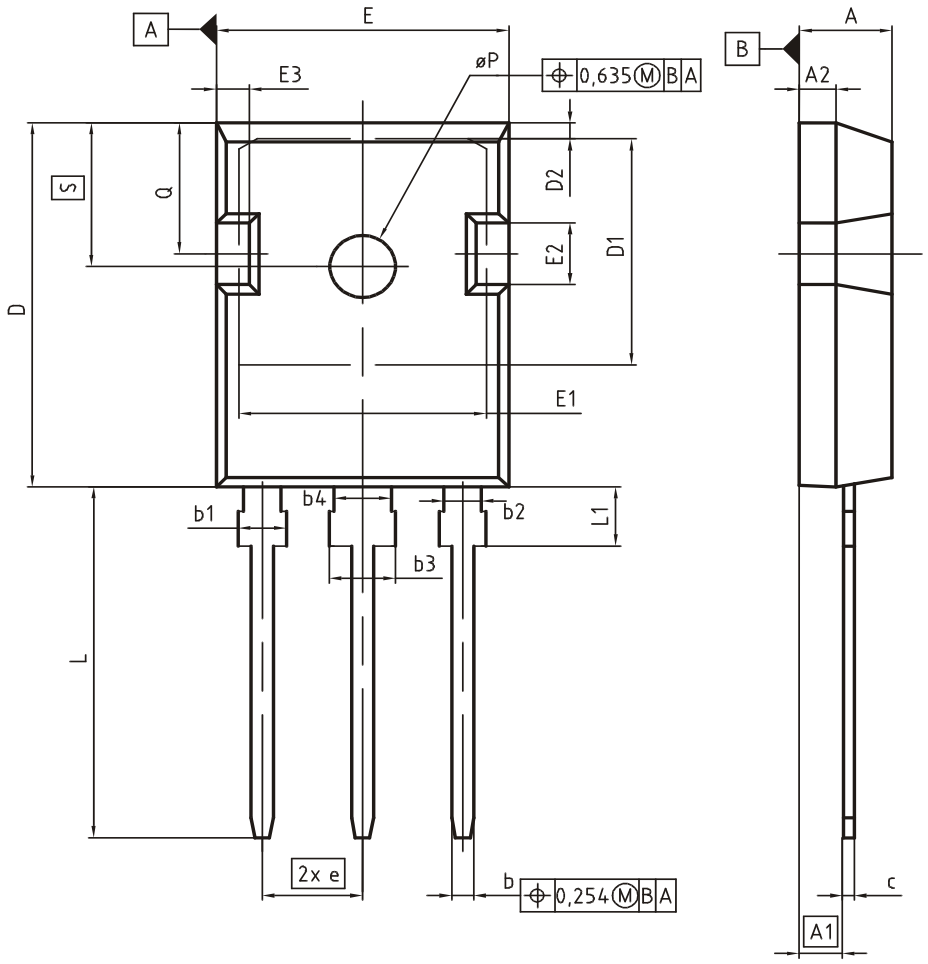


Figure 8. **Typical diode forward voltage per leg as a function of junction temperature**

PG-TO247-3



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.27	2.54	0.089	0.100
A2	1.85	2.16	0.073	0.085
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.13	0.618	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	2.60	0.039	0.102
e	5.44 (BSC)		0.214 (BSC)	
N	3		3	
L	19.80	20.32	0.780	0.800
L1	4.10	4.47	0.161	0.176
øP	3.50	3.70	0.138	0.146
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248

DOCUMENT NO.	Z8B00003327
SCALE	0 5 5 7.5mm
EUROPEAN PROJECTION	
ISSUE DATE	09-07-2010
REVISION	05

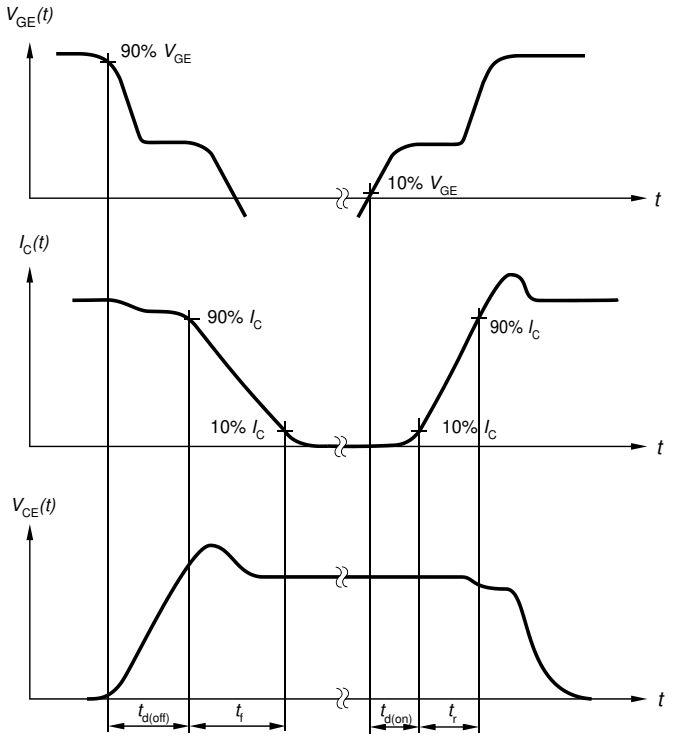


Figure A. **Definition of switching times**

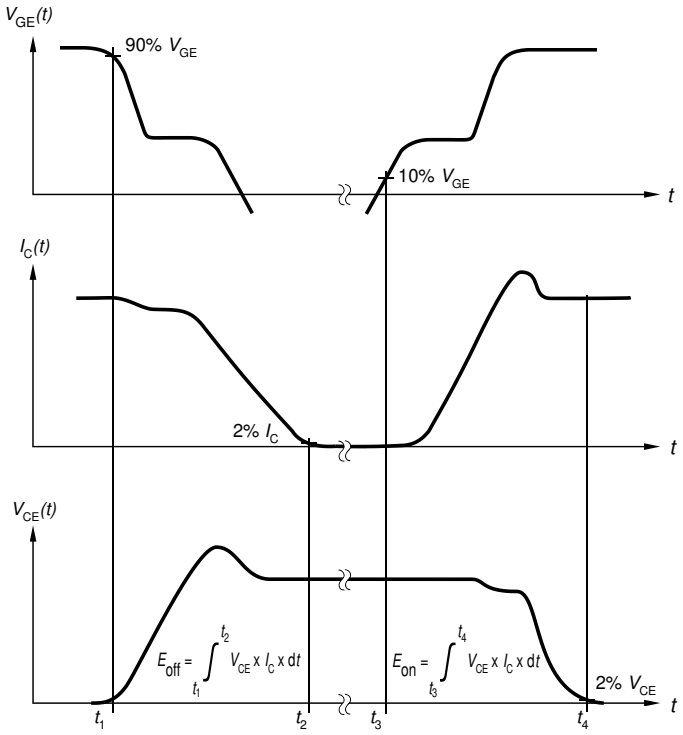


Figure B. **Definition of switching losses**

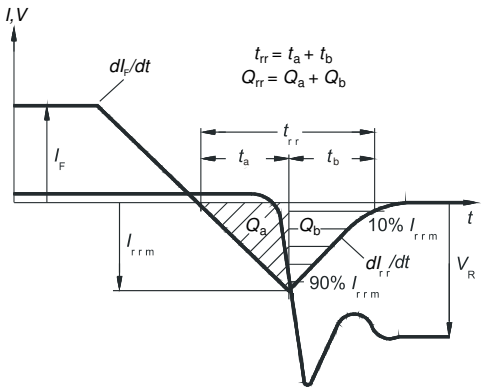


Figure C. **Definition of diode switching characteristics**

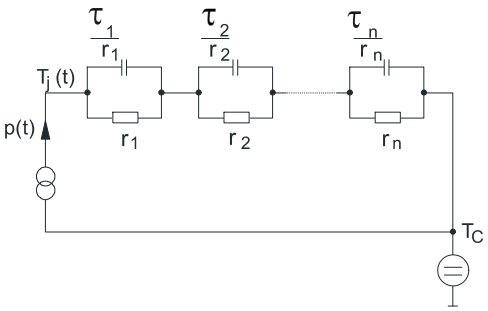


Figure D. **Thermal equivalent circuit**

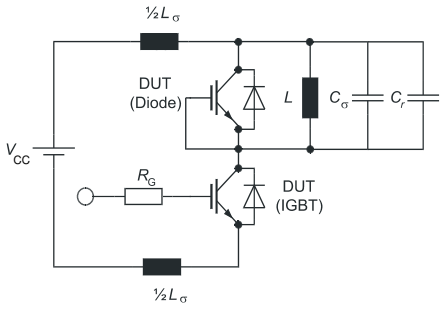


Figure E. **Dynamic test circuit**
Parasitic inductance L_σ,
parasitic capacitor C_σ,
relief capacitor C_r,
(only for ZVT switching)

Revision History

IDW20C65D2

Revision: 2014-12-09, Rev. 2.1

Previous Revision

Revision	Date	Subjects (major changes since last revision)
1.1	2014-12-02	Preliminary data sheet
2.1	2014-12-09	Final data sheet

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