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Diode

Rapid Switching Emitter Controlled Diode

IDV20E65D1

Emitter Controlled Diode Rapid 1 Series

Data sheet

Industrial Power Control

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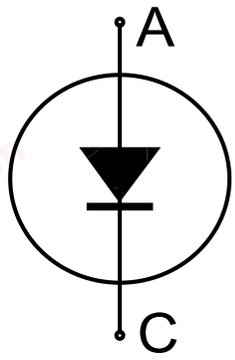
Rapid Switching Emitter Controlled Diode

Features:

- 650 V Emitter Controlled technology
- Temperature stable behaviour of key parameters
- Low forward voltage (V_F)
- Ultra fast recovery
- Low reverse recovery charge (Q_{rr})
- Low reverse recovery current (I_{rrm})
- 175 °C junction operating temperature
- Pb-free lead plating; RoHS compliant



Applications:

- AC/DC converters
- Boost diode in PFC stages
- Free wheeling diodes in inverters and motor drives
- General purpose inverters
- Switch mode power supplies



Green

Halogen-Free

RoHS

Key Performance and Package Parameters

Type	V_{rrm}	I_f	V_f, T_{vj}=25°C	T_{vjmax}	Marking	Package
IDV20E65D1	650V	20A	1.35V	175°C	E20ED1	PG-TO220-2-22 FP

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Maximum Ratings

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	 28.0 15.0	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	60.0	A
Diode surge non repetitive forward current T_C = 25°C, t_p = 10.0ms, sine halfwave	I_{FSM}	 120.0	A
Power dissipation T_C = 25°C	P_{tot}	38.0	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 Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
Diode thermal resistance,[1)] junction - case	$R_{th(j-c)}$		4.00	K/W
Thermal resistance junction - ambient	$R_{th(j-a)}$		65	K/W

Electrical Characteristic, 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 = 20.0A T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 175°C	 - - -	 1.35 1.30 1.26	 1.70 - -	V
Reverse leakage current	I_R	V_R = 650V T_{vj} = 25°C T_{vj} = 175°C	 - -	 2.0 350.0	 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.

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Switching Characteristic, 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 = 20.0A, di_F/dt = 1000A/µs, $L\sigma$ = 30nH, $C\sigma$ = 40pF, switch IKW50N65H5	-	42	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.45	-	µC
Diode peak reverse recovery current	I_{rrm}		-	15.6	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-1400	-	A/µs
Diode reverse recovery time	t_{rr}	T_{vj} = 25°C, V_R = 400V, I_F = 20.0A, di_F/dt = 300A/µs, $L\sigma$ = 30nH, $C\sigma$ = 40pF, switch IKW50N65H5	-	65	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.31	-	µC
Diode peak reverse recovery current	I_{rrm}		-	7.6	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-750	-	A/µs

Switching Characteristic, 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 = 20.0A, di_F/dt = 1000A/µs, $L\sigma$ = 30nH, $C\sigma$ = 40pF, switch IKW50N65H5	-	73	-	ns
Diode reverse recovery charge	Q_{rr}		-	1.12	-	µC
Diode peak reverse recovery current	I_{rrm}		-	24.5	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-850	-	A/µs
Diode reverse recovery time	t_{rr}	T_{vj} = 125°C, V_R = 400V, I_F = 20.0A, di_F/dt = 300A/µs, $L\sigma$ = 30nH, $C\sigma$ = 40pF, switch IKW50N65H5	-	92	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.79	-	µC
Diode peak reverse recovery current	I_{rrm}		-	13.5	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-880	-	A/µs

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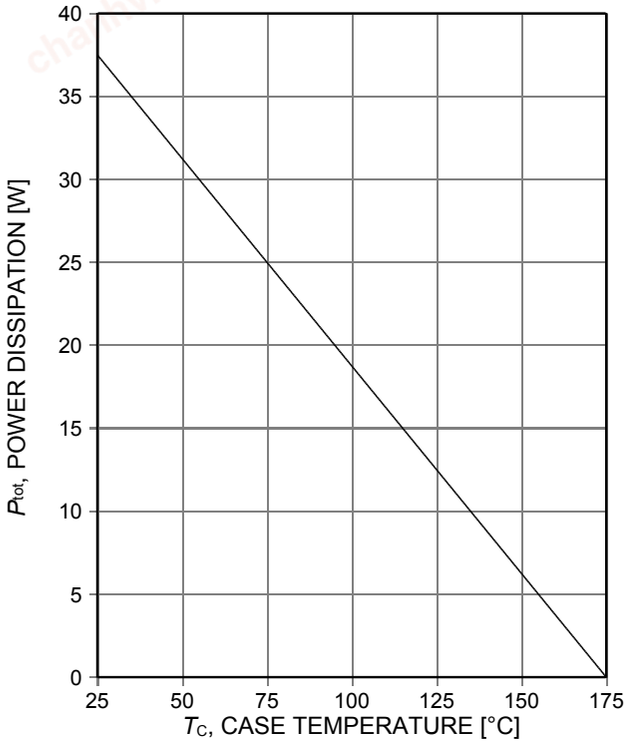

Figure 1. **Power dissipation as a function of case temperature**
(T_{vj}≤175°C)

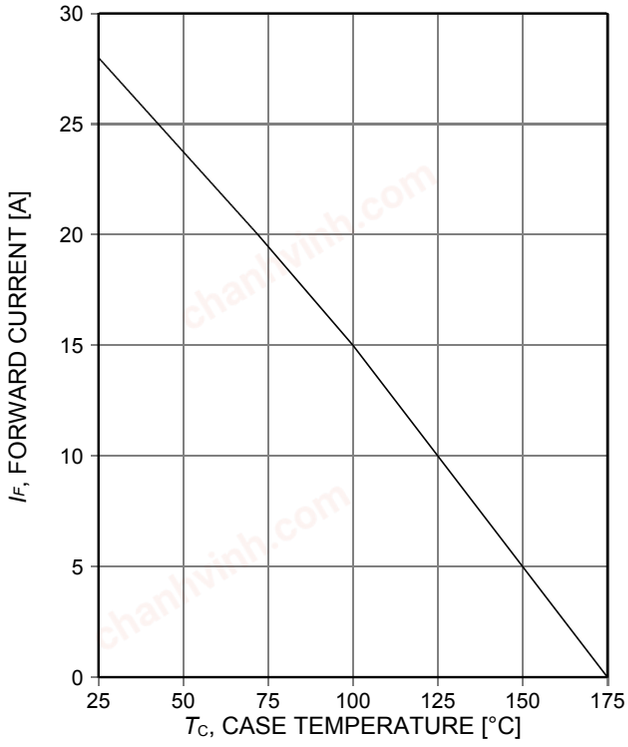

Figure 2. **Diode forward current as a function of case temperature**
(T_{vj}≤175°C)

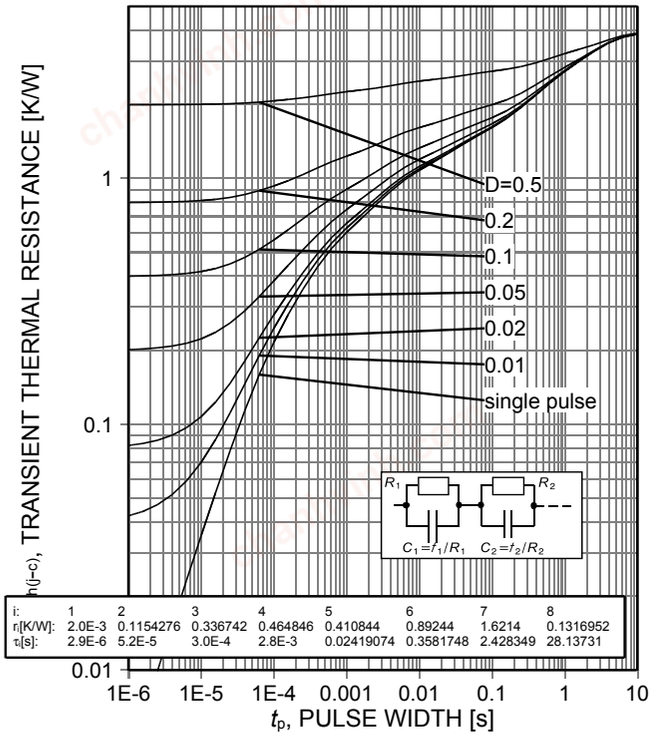

Figure 3. **Diode transient thermal impedance as a function of pulse width**
($D=t_p/T$)

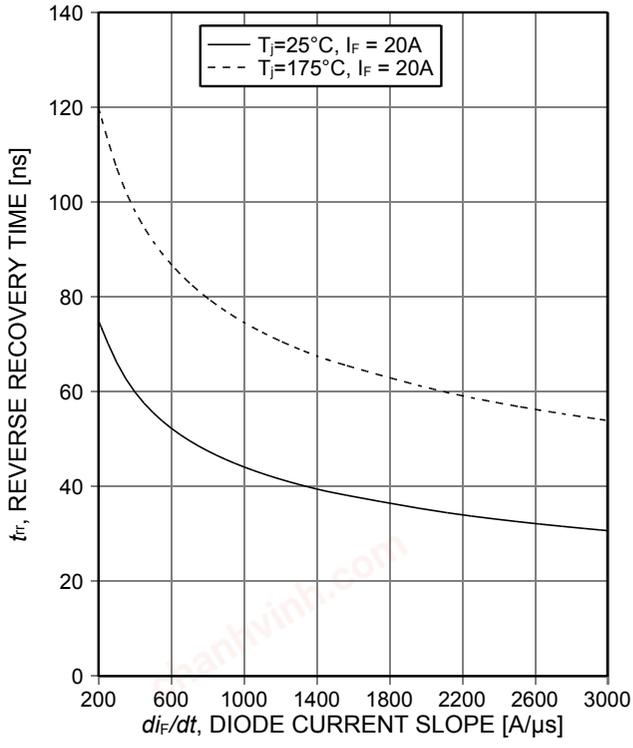

Figure 4. **Typical reverse recovery time as a function of diode current slope**
(V_R=400V)

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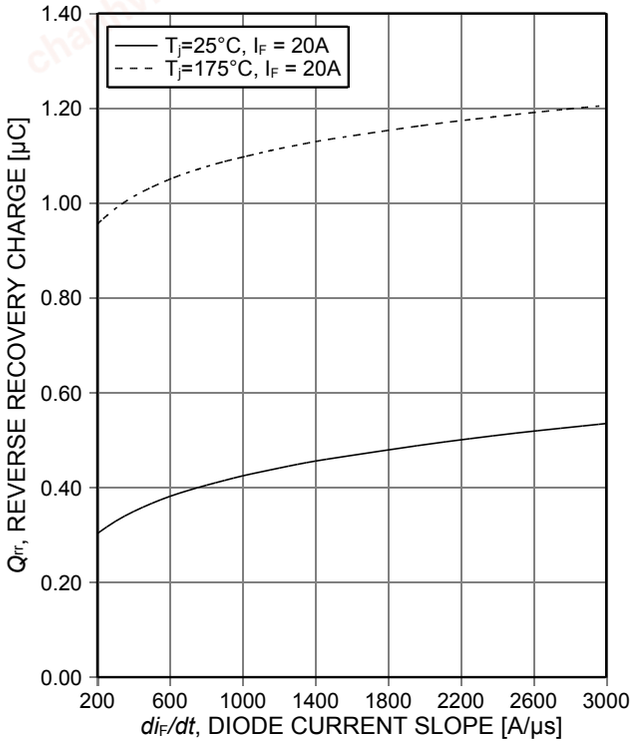

Figure 5. **Typical reverse recovery charge as a function of diode current slope**
(V_R=400V)

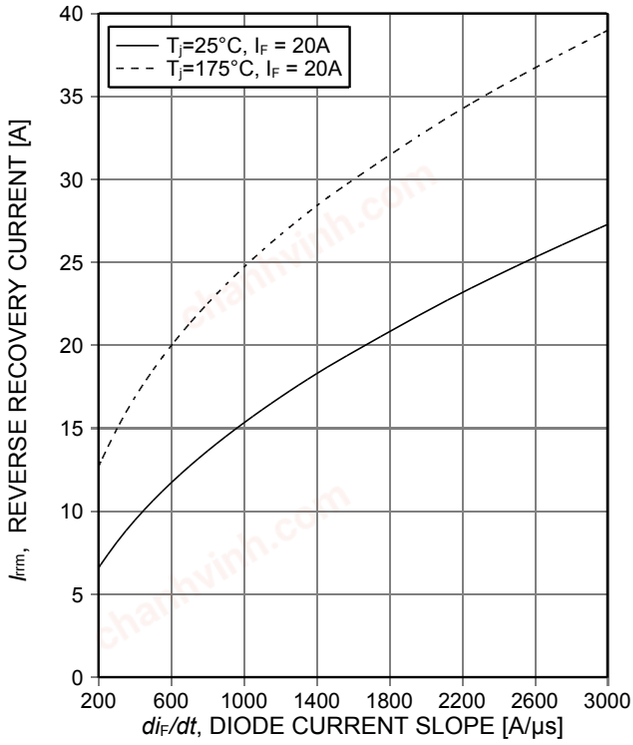

Figure 6. **Typical peak reverse recovery current as a function of diode current slope**
(V_R=400V)

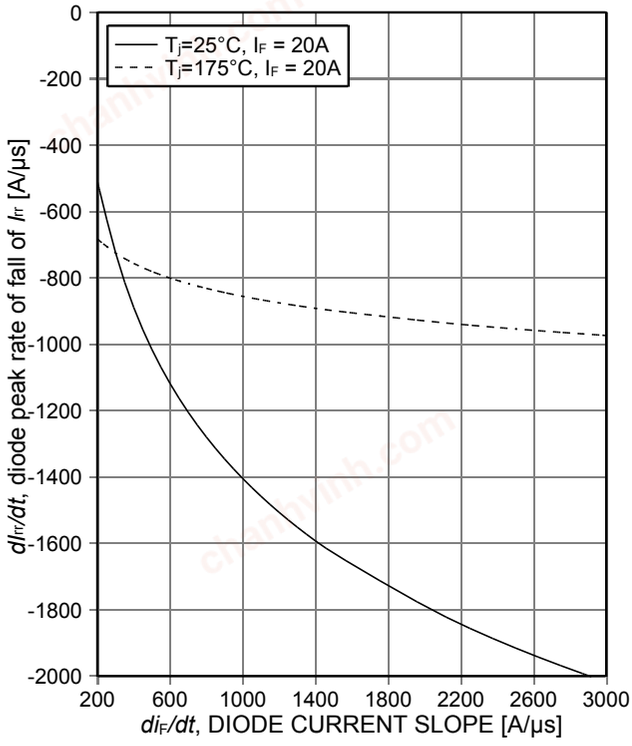

Figure 7. **Typical diode peak rate of fall of reverse recovery current as a function of diode current slope**
(V_R=400V)

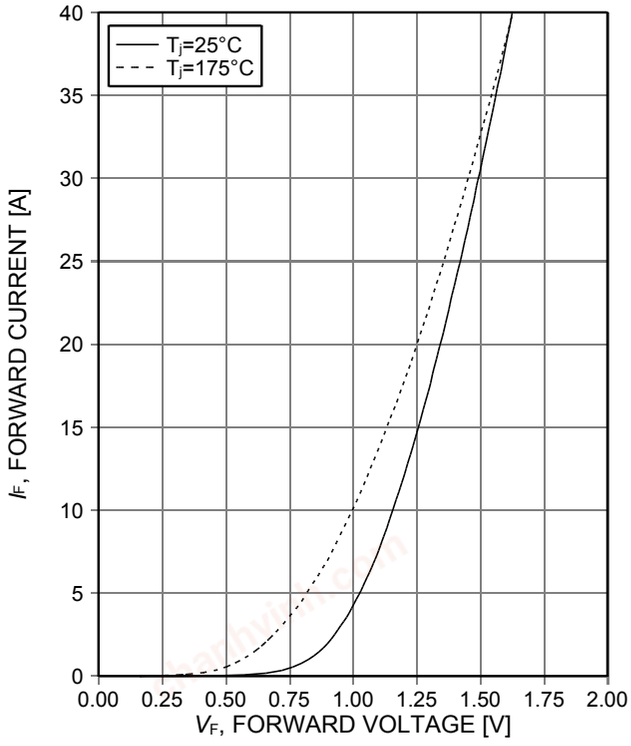

Figure 8. **Typical diode forward current as a function of forward voltage**

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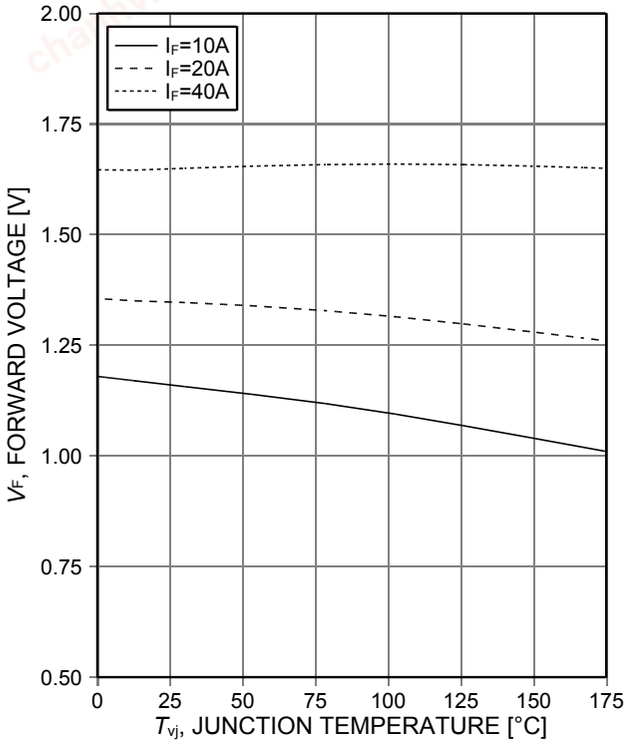

Figure 9. **Typical diode forward voltage as a function of junction temperature**

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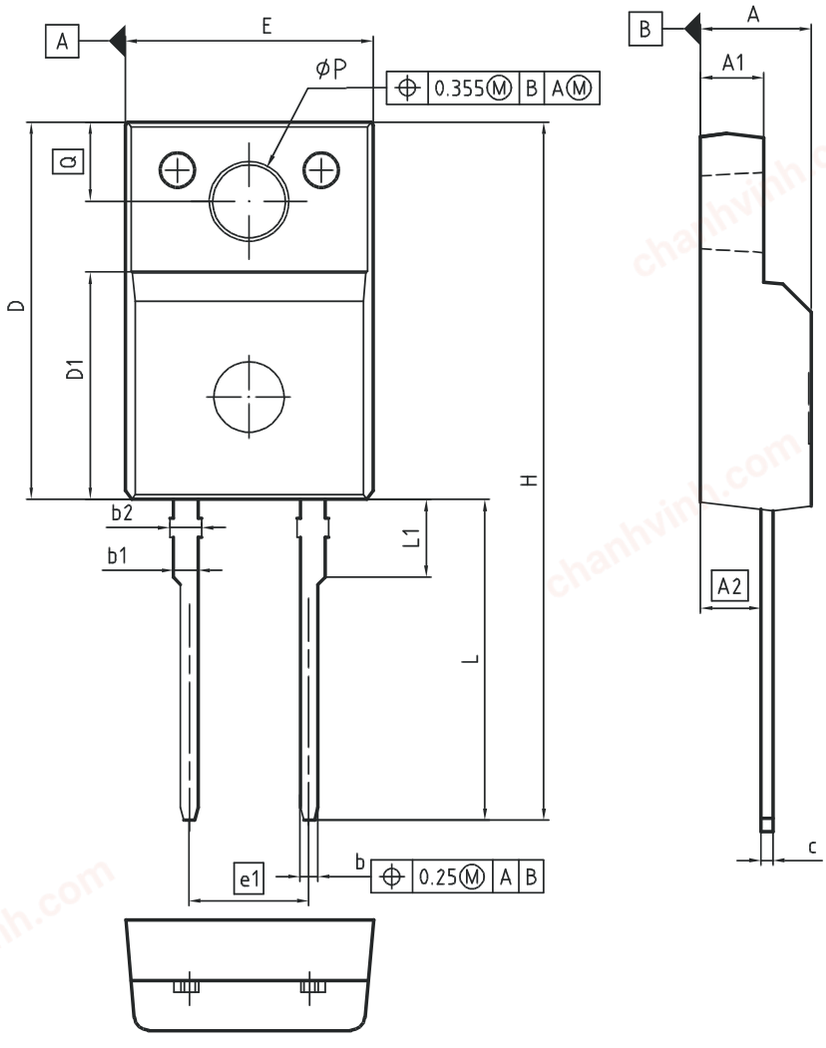
PG-TO220-2-22



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.55	4.85	0.179	0.191
A1	2.55	2.85	0.100	0.112
A2	2.42	2.72	0.095	0.107
b	0.65	0.85	0.026	0.033
b1	0.95	1.15	0.037	0.045
b2	0.95	1.35	0.037	0.053
c	0.40	0.60	0.016	0.024
D	15.85	16.15	0.624	0.636
D1	9.53	9.83	0.375	0.387
E	10.35	10.65	0.407	0.419
e1	5.08		0.200	
N	2		2	
H	29.30	29.90	1.154	1.177
L	13.45	13.75	0.530	0.541
L1	3.15	3.45	0.124	0.136
øP	3.00	3.20	0.118	0.126
Q	3.20	3.50	0.126	0.138

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Z8B00155551

SCALE
0 2.5 5mm

EUROPEAN PROJECTION

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21-12-2009

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01

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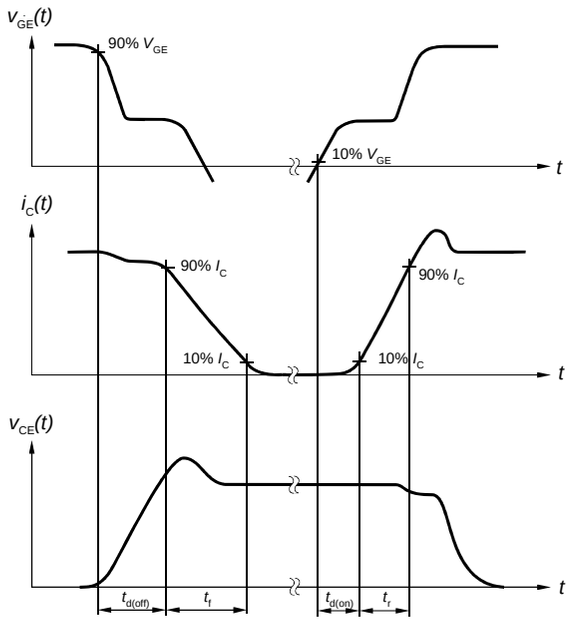

Figure A. Definition of switching times

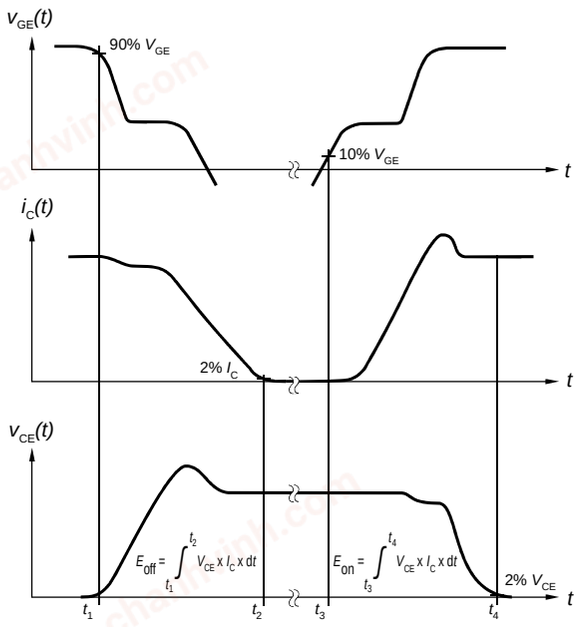

Figure B. Definition of switching losses

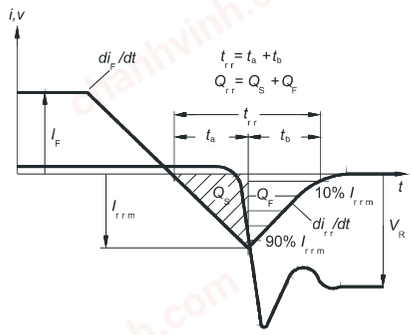

Figure C. Definition of diodes switching characteristics

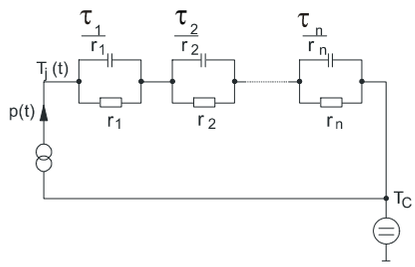

Figure D. Thermal equivalent circuit

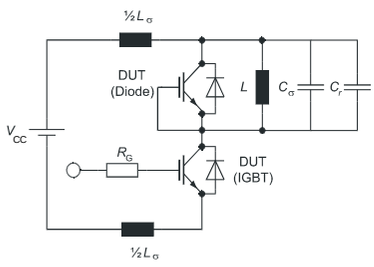

Figure E. Dynamic test circuit
Parasitic inductance L_σ,
Parasitic capacitor C_σ,
Relief capacitor C_r
(only for ZVT switching)

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Revision History

IDV20E65D1

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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