

Diode

Rapid Switching Emitter Controlled Diode

IDW75D65D1

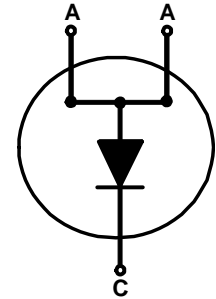
Emitter Controlled Diode Rapid 1 Dual Anode Series

Data sheet

Rapid Switching Emitter Controlled Diode

Features:

- Qualified according to JEDEC for target applications
- 650V 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



Package pin definition:

- Pin 1 - anode
- Pin 2 and backside - cathode
- Pin 3 - anode



Key Performance and Package Parameters

Type	V_{rrm}	I_f	$V_f, T_{vj}=25^\circ\text{C}$	T_{vjmax}	Marking	Package
IDW75D65D1	650V	75A	1.35V	175°C	D75ED1	PG-TO247-3



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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, $T_{vj} \geq 25^{\circ}\text{C}$	V_{RRM}	650	V
Diode forward current, limited by T_{vjmax} ¹⁾ $T_C = 25^{\circ}\text{C}$ $T_C = 100^{\circ}\text{C}$	I_F	150.0 75.0	A
Diode pulsed current, t_p limited by T_{vjmax}	I_{Fpuls}	225.0	A
Diode surge non repetitive forward current ²⁾ $T_C = 25^{\circ}\text{C}$, $t_p = 10.0\text{ms}$, sine halfwave	I_{FSM}	580.0	A
Power dissipation $T_C = 25^{\circ}\text{C}$ Power dissipation $T_C = 100^{\circ}\text{C}$	P_{tot}	326.0 163.0	W
Operating junction temperature	T_{vj}	-40...+175	$^{\circ}\text{C}$
Storage temperature	T_{stg}	-55...+150	$^{\circ}\text{C}$
Soldering temperature, wave soldering 1.6mm (0.063in.) from case for 10s		260	$^{\circ}\text{C}$
Mounting torque, M3 screw Maximum of mounting processes: 3	M	0.6	Nm

Thermal Resistances

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
Diode thermal resistance, ³⁾ junction - case	$R_{th(j-c)}$		0.46	K/W
Thermal resistance junction - ambient	$R_{th(j-a)}$		40	K/W

Electrical Characteristics, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Diode forward voltage	V_F	$I_F = 75.0\text{A}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	- - -	1.35 1.32 1.28	1.70 - -	V
Reverse leakage current	I_R	$V_R = 650\text{V}$ $T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 175^{\circ}\text{C}$	- -	- 3000.0	40.0 -	μA

¹⁾ Maximum current for pin 1 and pin 3 is 80A (value limited by bondwire).

²⁾ For a balanced current flow through pins 1 and 3.

³⁾ Please be aware that in nonstandard load conditions, due to high $R_{th(j-c)}$, T_{vj} close to T_{vjmax} can be reached.

Electrical Characteristic, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Dynamic Characteristic						
Internal emitter inductance ¹⁾ measured 5mm (0.197 in.) from case	L_E		-	7.0	-	nH

Switching Characteristics, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	

Diode Characteristic, at $T_{vj} = 25^{\circ}\text{C}$

Diode reverse recovery time	t_{rr}	$T_{vj} = 25^{\circ}\text{C}$, $V_R = 400\text{V}$, $I_F = 75.0\text{A}$, $di_F/dt = 1000\text{A}/\mu\text{s}$, $L\sigma = 30\text{nH}$, $C\sigma = 40\text{pF}$, switch IGZ100N65H5.	-	108	-	ns
Diode reverse recovery charge	Q_{rr}		-	1.25	-	μC
Diode peak reverse recovery current	I_{rrm}		-	19.9	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-1100	-	$\text{A}/\mu\text{s}$

Diode reverse recovery time	t_{rr}	$T_{vj} = 25^{\circ}\text{C}$, $V_R = 400\text{V}$, $I_F = 40.0\text{A}$, $di_F/dt = 200\text{A}/\mu\text{s}$, $L\sigma = 30\text{nH}$, $C\sigma = 40\text{pF}$, switch IGZ100N65H5.	-	127	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.48	-	μC
Diode peak reverse recovery current	I_{rrm}		-	6.4	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-32	-	$\text{A}/\mu\text{s}$

Switching Characteristics, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	

Diode Characteristic, at $T_{vj} = 175^{\circ}\text{C}/125^{\circ}\text{C}$

Diode reverse recovery time	t_{rr}	$T_{vj} = 175^{\circ}\text{C}$, $V_R = 400\text{V}$, $I_F = 75.0\text{A}$, $di_F/dt = 1000\text{A}/\mu\text{s}$, $L\sigma = 30\text{nH}$, $C\sigma = 40\text{pF}$, switch IGZ100N65H5.	-	174	-	ns
Diode reverse recovery charge	Q_{rr}		-	4.16	-	μC
Diode peak reverse recovery current	I_{rrm}		-	37.9	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-1170	-	$\text{A}/\mu\text{s}$

¹⁾ For a balanced current flow through pins 1 and 3.

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Diode reverse recovery time	t_{rr}	$T_{vj} = 125^{\circ}\text{C}$, $V_R = 400\text{V}$, $I_F = 40.0\text{A}$, $di_F/dt = 200\text{A}/\mu\text{s}$, $L\sigma = 30\text{nH}$, $C\sigma = 40\text{pF}$, switch IGZ100N65H5.	-	184	-	ns
Diode reverse recovery charge	Q_{rr}		-	1.64	-	μC
Diode peak reverse recovery current	I_{rrm}		-	13.2	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	-62	-	$\text{A}/\mu\text{s}$

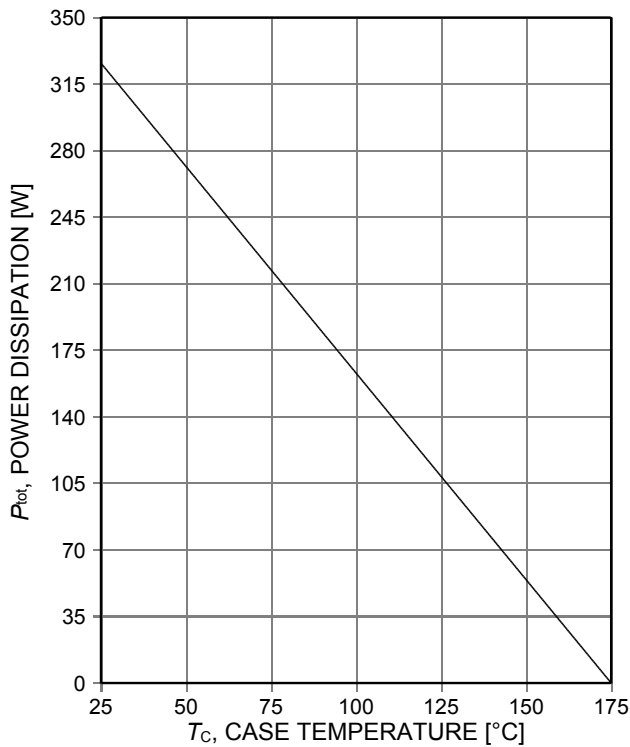


Figure 1. Power dissipation as a function of case temperature ($T_{vj} \leq 175^\circ\text{C}$)

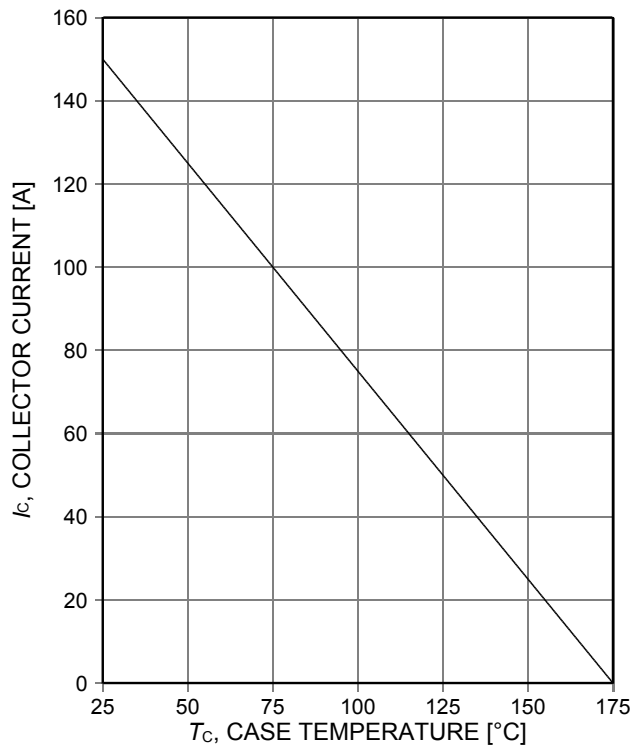


Figure 2. Collector current as a function of case temperature ($V_{GE} \geq 15\text{V}$, $T_{vj} \leq 175^\circ\text{C}$)

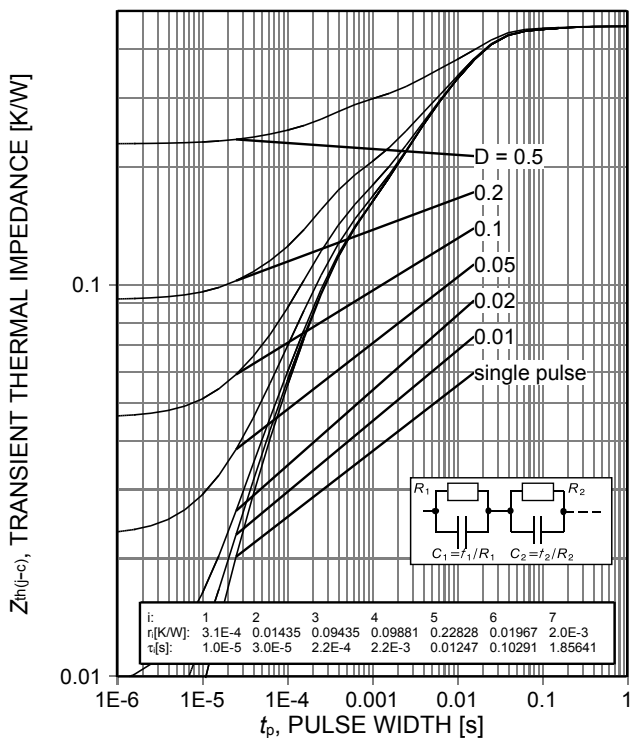


Figure 3. Diode transient thermal impedance as a function of pulse width ($D = t_p/T$)

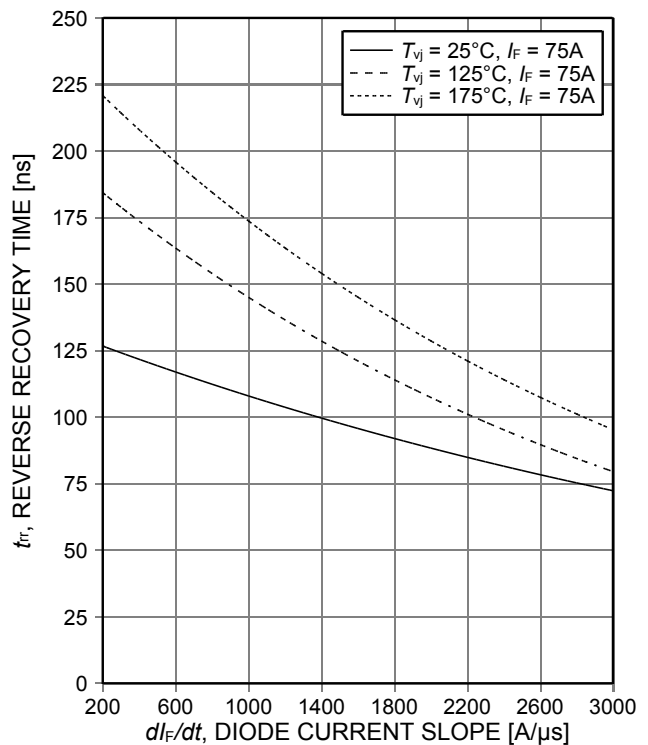


Figure 4. Typical reverse recovery time as a function of diode current slope ($V_R = 400\text{V}$)

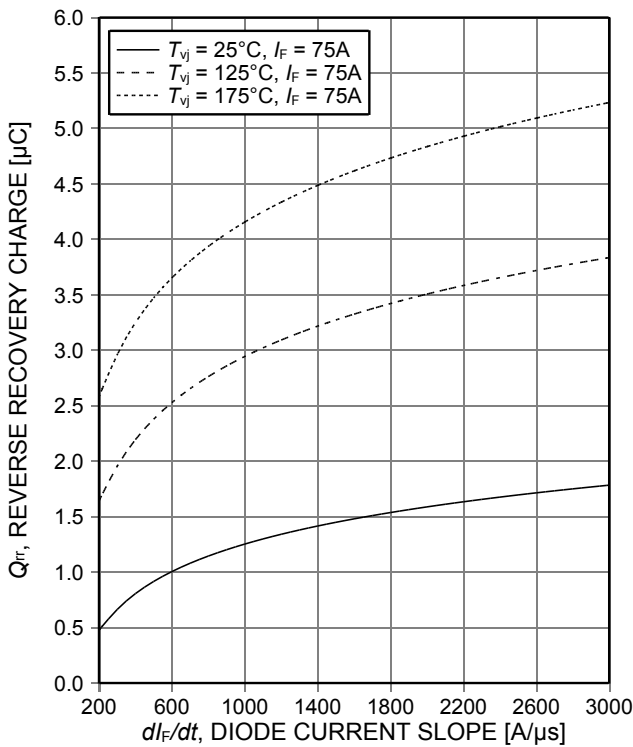


Figure 5. Typical reverse recovery charge as a function of diode current slope ($V_R=400V$)

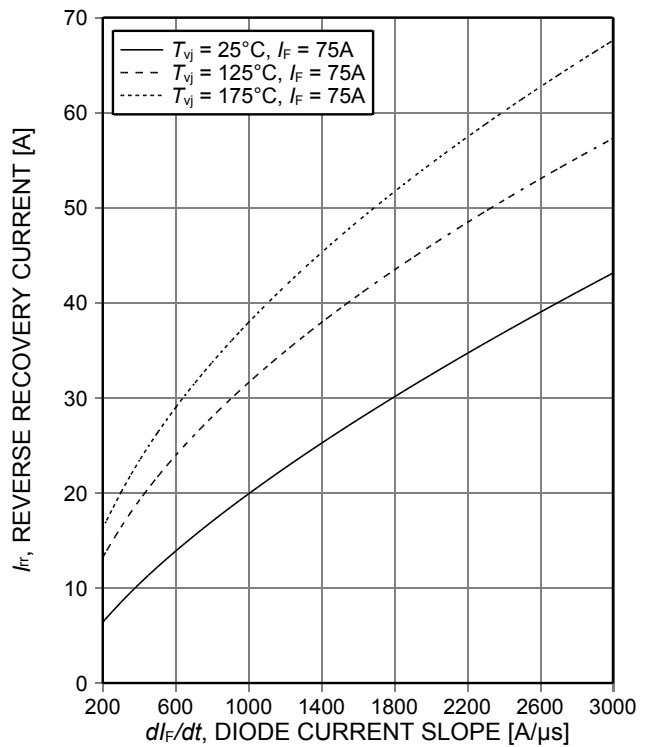


Figure 6. Typical reverse recovery current as a function of diode current slope ($V_R=400V$)

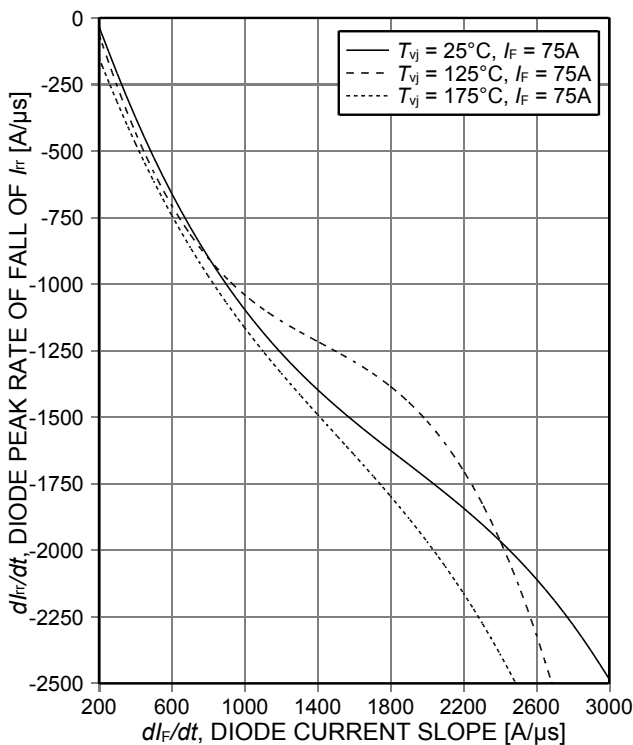


Figure 7. Typical diode peak rate of fall of reverse recovery current as a function of diode current slope ($V_R=400V$)

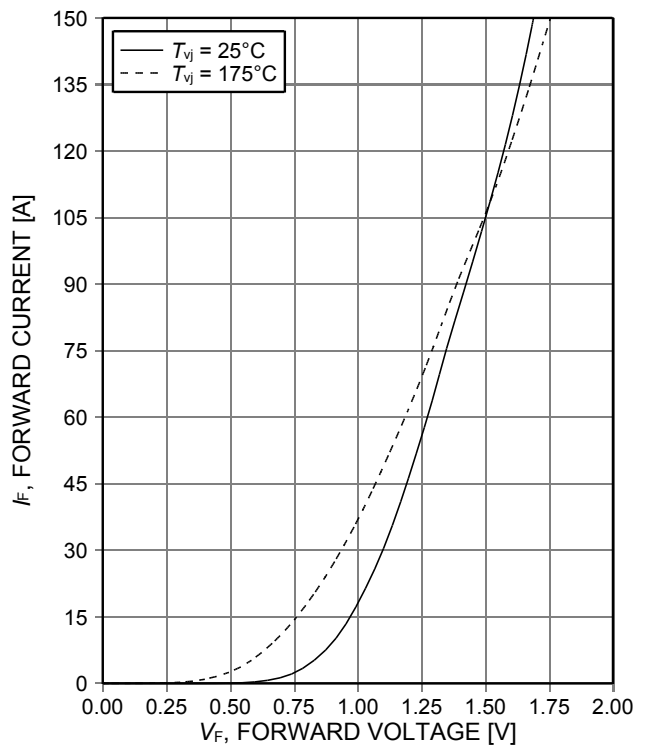


Figure 8. Typical diode forward current as a function of forward voltage

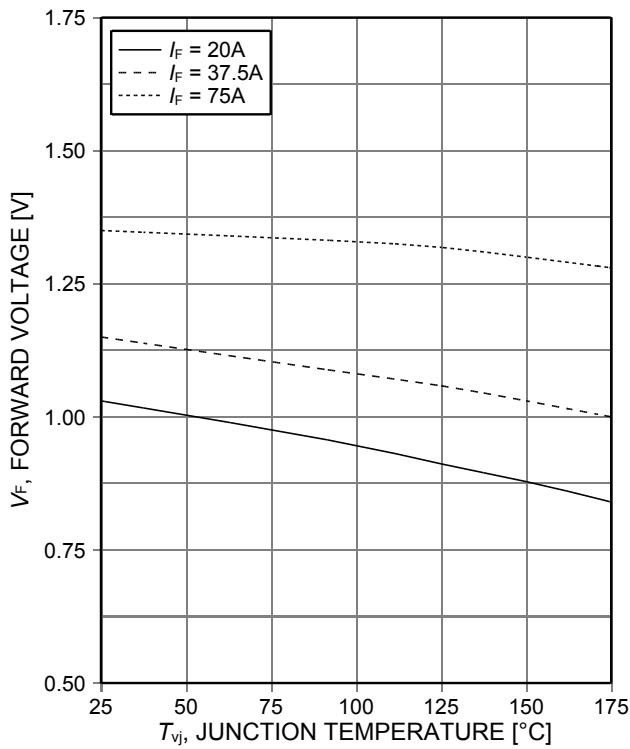
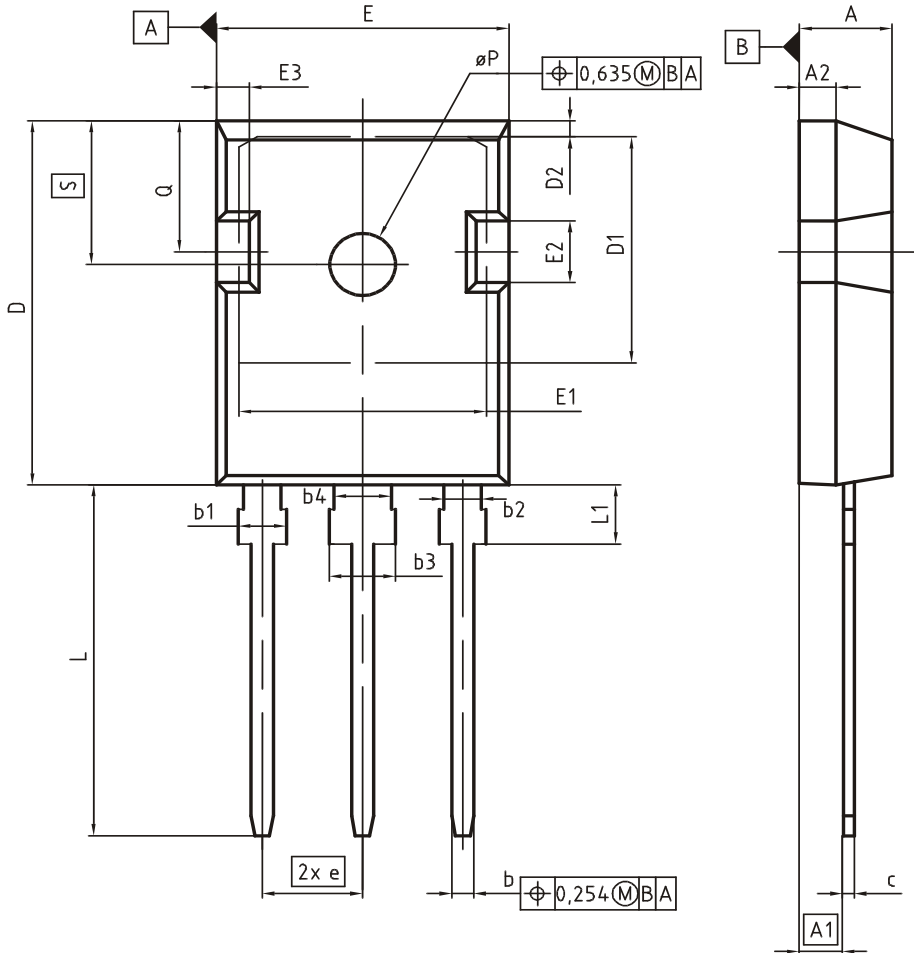


Figure 9. Typical diode forward voltage as a function of junction temperature

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

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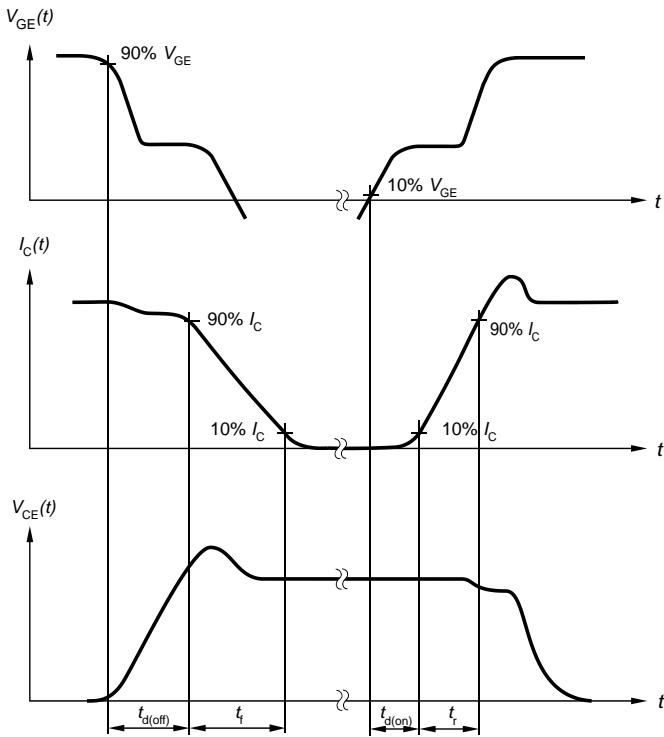


Figure A. Definition of switching times

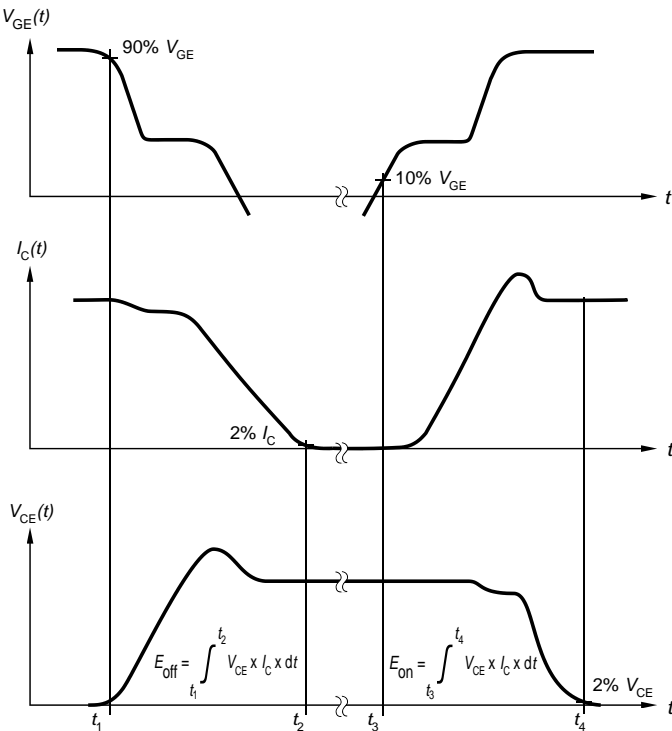


Figure B. Definition of switching losses

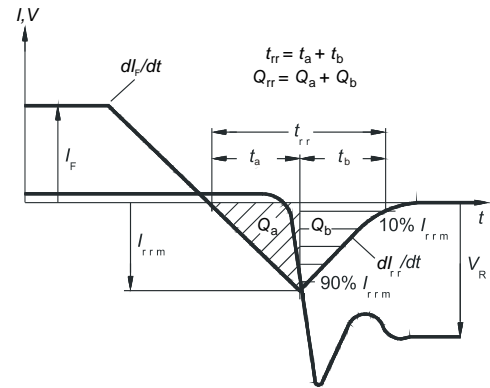


Figure C. Definition of diode switching characteristics

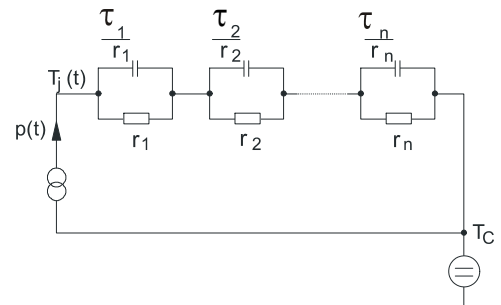


Figure D. Thermal equivalent circuit

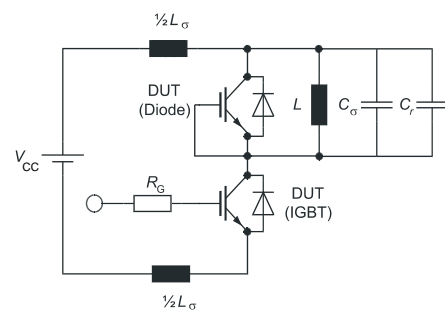


Figure E. Dynamic test circuit
Parasitic inductance L_{σ} ,
parasitic capacitor C_{σ} ,
relief capacitor C_r ,
(only for ZVT switching)