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## Diode

Rapid Switching Emitter Controlled Diode

## IDV15E65D2

FullPAK with Emitter Controlled Diode

Data sheet



IDV15E65D2

Emitter Controlled Diode

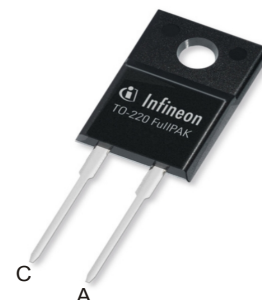
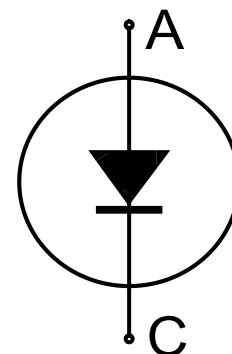
## Rapid Switching Emitter Controlled Diode

### Features:

- Electrically isolated FullPAK for efficient assembly
- 650 V Emitter Controlled technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- Qualified according to JESD-022 for target applications
- Pb-free lead plating; RoHS compliant
- Halogen free (according to IEC 61249-2-21)
- Complete product spectrum and PSpice Models:  
<http://www.infineon.com/diode/>

### Applications:

- Boost diode in CCM PFC



### Key Performance and Package Parameters

Type	$V_{rrm}$	$I_f$	$V_f, T_{vj}=25^{\circ}\text{C}$	$T_{vjmax}$	Marking	Package
IDV15E65D2	650V	15A	1.6V	175°C	E15ED2	PG-TO220-2-22 FP



## IDV15E65D2

### Emitter Controlled Diode

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# IDV15E65D2

## Emitter Controlled Diode

### 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	$V_{RRM}$	650	V
Diode forward current, limited by $T_{vjmax}$ $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	$I_F$	15.0 7.5	A
Diode pulsed current, $t_p$ limited by $T_{vjmax}$	$I_{Fpuls}$	45.0	A
Diode surge non repetitive forward current $T_C = 25^\circ\text{C}$ , $t_p = 8.3\text{ms}$ , sine halfwave	$I_{FSM}$	100.0	A
Power dissipation $T_C = 25^\circ\text{C}$	$P_{tot}$	34.0	W
Operating junction temperature	$T_{vj}$	-40...+175	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55...+150	$^\circ\text{C}$
Soldering temperature, wave soldering 1.6 mm (0.063 in.) from case for 10s		260	$^\circ\text{C}$
Mounting torque, M3 screw Maximum of mounting processes: 3	$M$	0.6	Nm

### Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
<b>Characteristic</b>				
Diode thermal resistance, <sup>1)</sup> junction - case	$R_{th(j-c)}$		4.40	K/W
Thermal resistance junction - ambient	$R_{th(j-a)}$		65	K/W

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

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
<b>Static Characteristic</b>						
Diode forward voltage	$V_F$	$I_F = 15.0\text{A}$ $T_{vj} = 25^\circ\text{C}$ $T_{vj} = 175^\circ\text{C}$	- -	1.60 1.65	2.20 -	V
Reverse leakage current	$I_R$	$V_R = 650\text{V}$ $T_{vj} = 25^\circ\text{C}$ $T_{vj} = 175^\circ\text{C}$	- -	- -	40.0 4000.0	$\mu\text{A}$

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

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



# IDV15E65D2

## Emitter Controlled Diode

### Switching Characteristic, Inductive Load

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	

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

Diode reverse recovery time	$t_{rr}$	$T_{vj} = 25^{\circ}\text{C}$ , $V_R = 400\text{V}$ , $I_F = 15.0\text{A}$ , $di_F/dt = 1000\text{A}/\mu\text{s}$ , $L\sigma = 35\text{nH}$ , $C\sigma = 32\text{pF}$ , switch IPW60R045CP	-	30	-	ns
Diode reverse recovery charge	$Q_{rr}$		-	0.20	-	$\mu\text{C}$
Diode peak reverse recovery current	$I_{rrm}$		-	12.8	-	A
Diode peak rate of fall of reverse recovery current during $t_b$	$di_{rr}/dt$		-	-6500	-	$\text{A}/\mu\text{s}$

Diode reverse recovery time	$t_{rr}$	$T_{vj} = 25^{\circ}\text{C}$ , $V_R = 400\text{V}$ , $I_F = 15.0\text{A}$ , $di_F/dt = 200\text{A}/\mu\text{s}$ , $L\sigma = 35\text{nH}$ , $C\sigma = 32\text{pF}$ , switch IPW60R045CP	-	47	-	ns
Diode reverse recovery charge	$Q_{rr}$		-	0.12	-	$\mu\text{C}$
Diode peak reverse recovery current	$I_{rrm}$		-	3.3	-	A
Diode peak rate of fall of reverse recovery current during $t_b$	$di_{rr}/dt$		-	-1500	-	$\text{A}/\mu\text{s}$

### Switching Characteristic, 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	$t_{rr}$	$T_{vj} = 175^{\circ}\text{C}$ , $V_R = 400\text{V}$ , $I_F = 15.0\text{A}$ , $di_F/dt = 1000\text{A}/\mu\text{s}$ , $L\sigma = 35\text{nH}$ , $C\sigma = 32\text{pF}$ , switch IPW60R045CP	-	30	-	ns
Diode reverse recovery charge	$Q_{rr}$		-	0.37	-	$\mu\text{C}$
Diode peak reverse recovery current	$I_{rrm}$		-	16.9	-	A
Diode peak rate of fall of reverse recovery current during $t_b$	$di_{rr}/dt$		-	-6800	-	$\text{A}/\mu\text{s}$

Diode reverse recovery time	$t_{rr}$	$T_{vj} = 125^{\circ}\text{C}$ , $V_R = 400\text{V}$ , $I_F = 15.0\text{A}$ , $di_F/dt = 200\text{A}/\mu\text{s}$ , $L\sigma = 35\text{nH}$ , $C\sigma = 32\text{pF}$ , switch IPW60R045CP	-	51	-	ns
Diode reverse recovery charge	$Q_{rr}$		-	0.21	-	$\mu\text{C}$
Diode peak reverse recovery current	$I_{rrm}$		-	5.0	-	A
Diode peak rate of fall of reverse recovery current during $t_b$	$di_{rr}/dt$		-	-1900	-	$\text{A}/\mu\text{s}$



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Emitter Controlled Diode

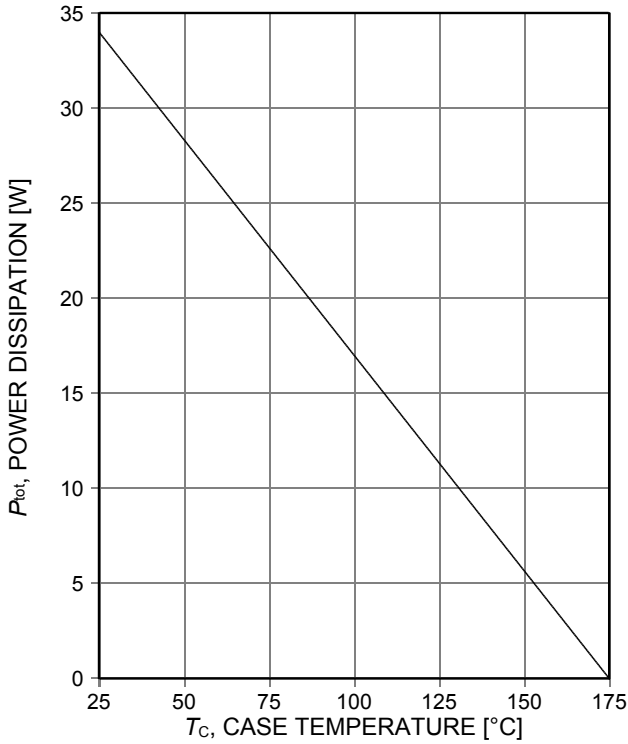


Figure 1. Power dissipation as a function of case temperature ( $T_{vj} \leq 175^\circ\text{C}$ )

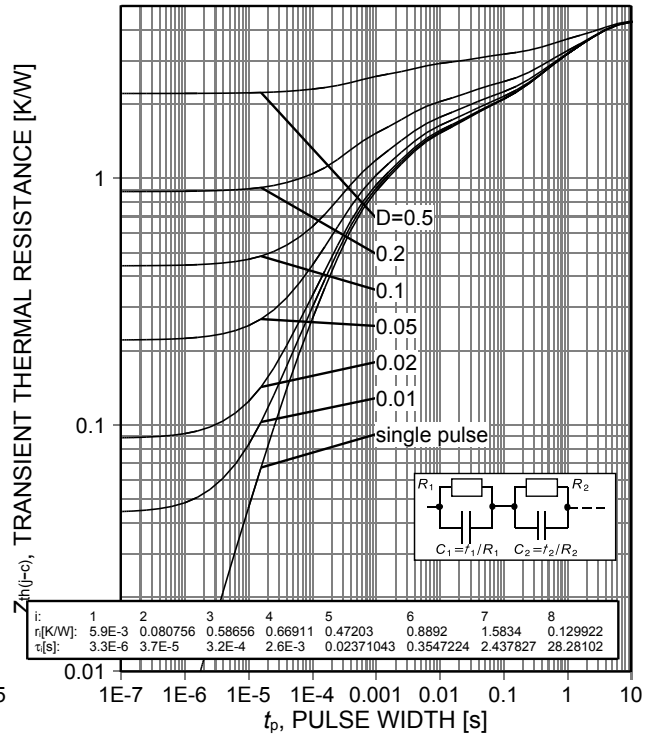


Figure 2. Diode transient thermal impedance as a function of pulse width ( $D = t_p/T$ )

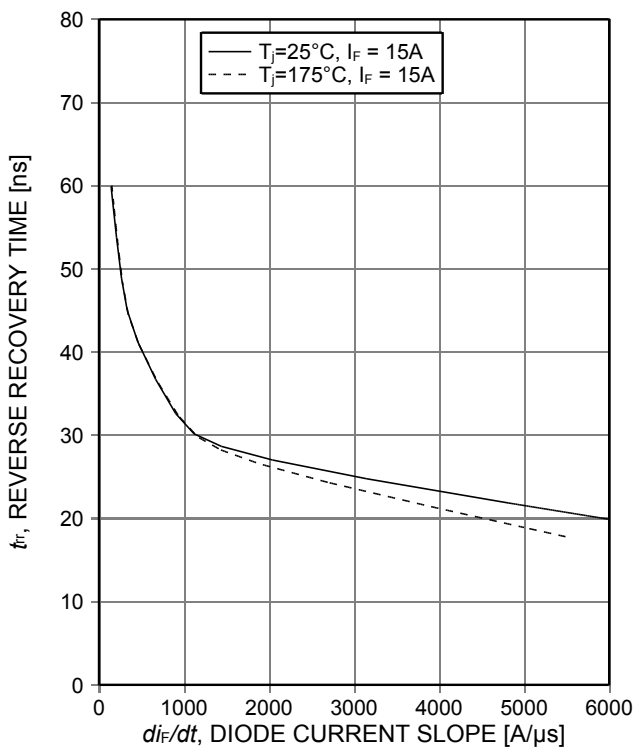


Figure 3. Typical reverse recovery time as a function of diode current slope ( $V_R = 400V$ )

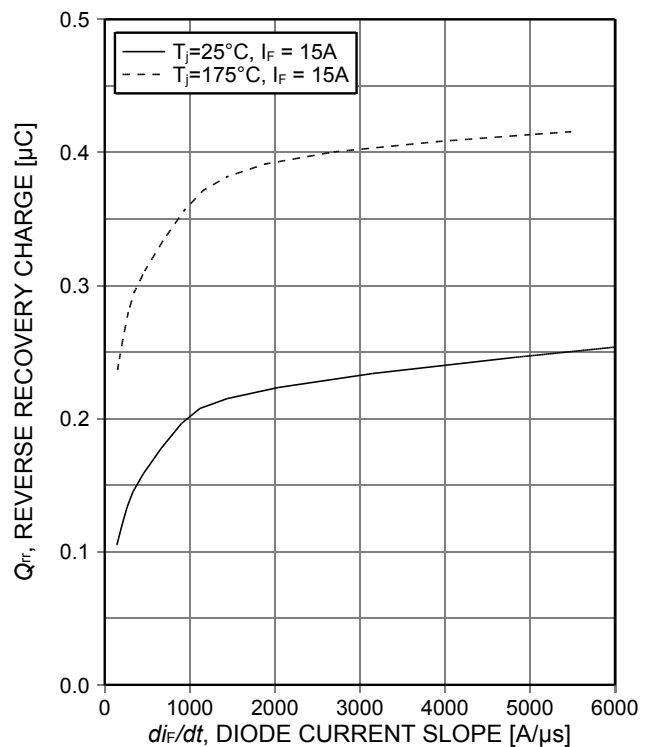


Figure 4. Typical reverse recovery charge as a function of diode current slope ( $V_R = 400V$ )



Emitter Controlled Diode

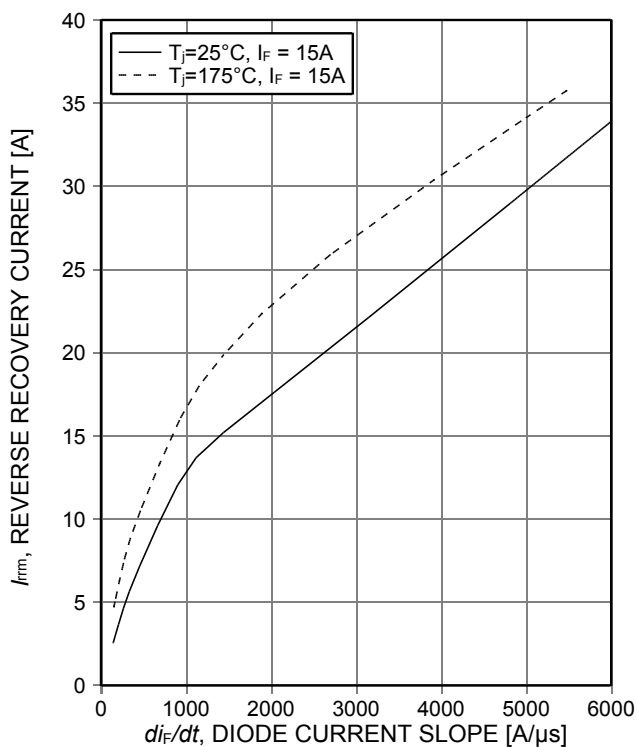


Figure 5. Typical peak reverse recovery current as a function of diode current slope ( $V_R=400V$ )

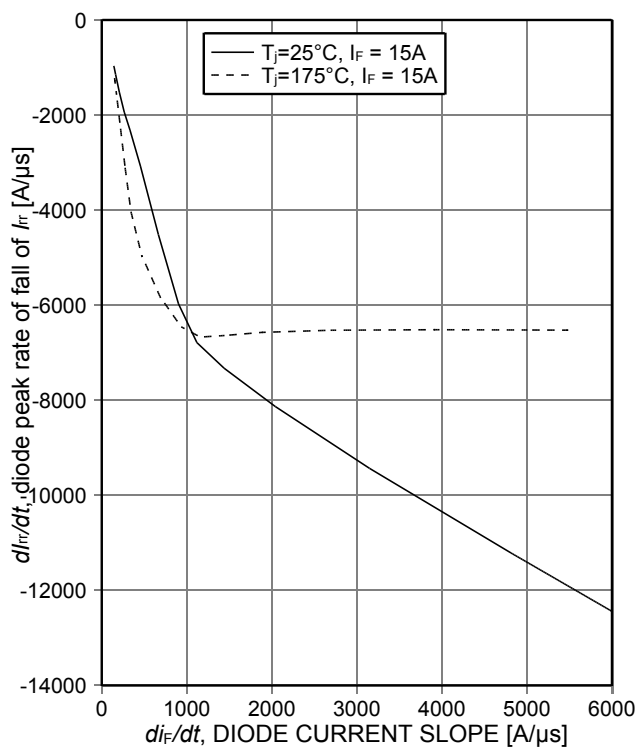


Figure 6. Typical diode peak rate of fall of reverse recovery current as a function of diode current slope ( $V_R=400V$ )

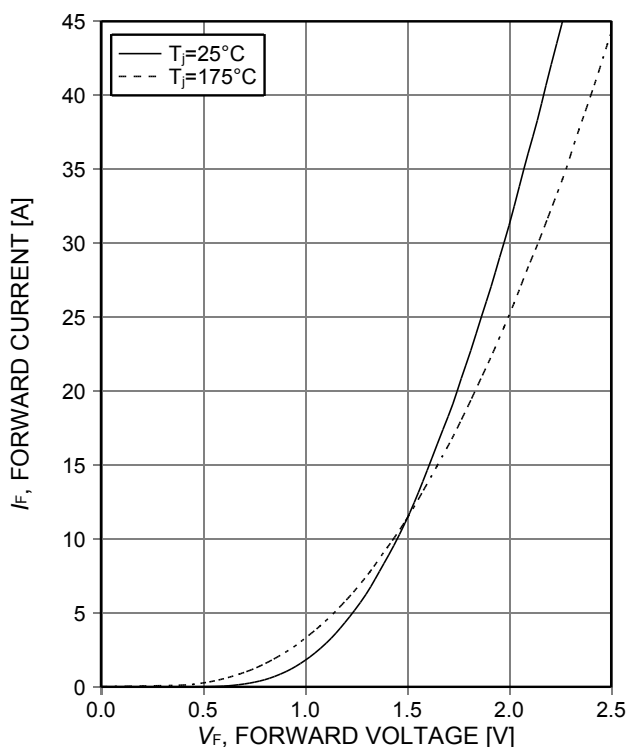


Figure 7. Typical diode forward current as a function of forward voltage

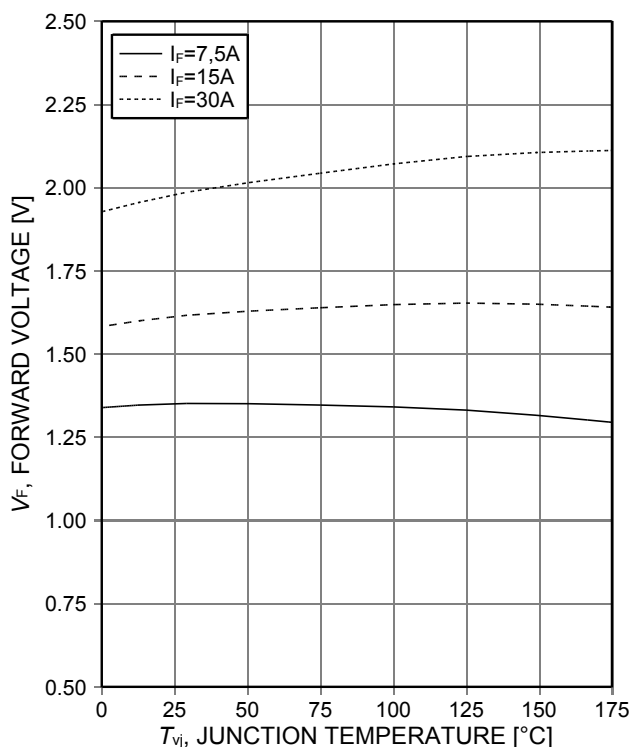


Figure 8. Typical diode forward voltage as a function of junction temperature

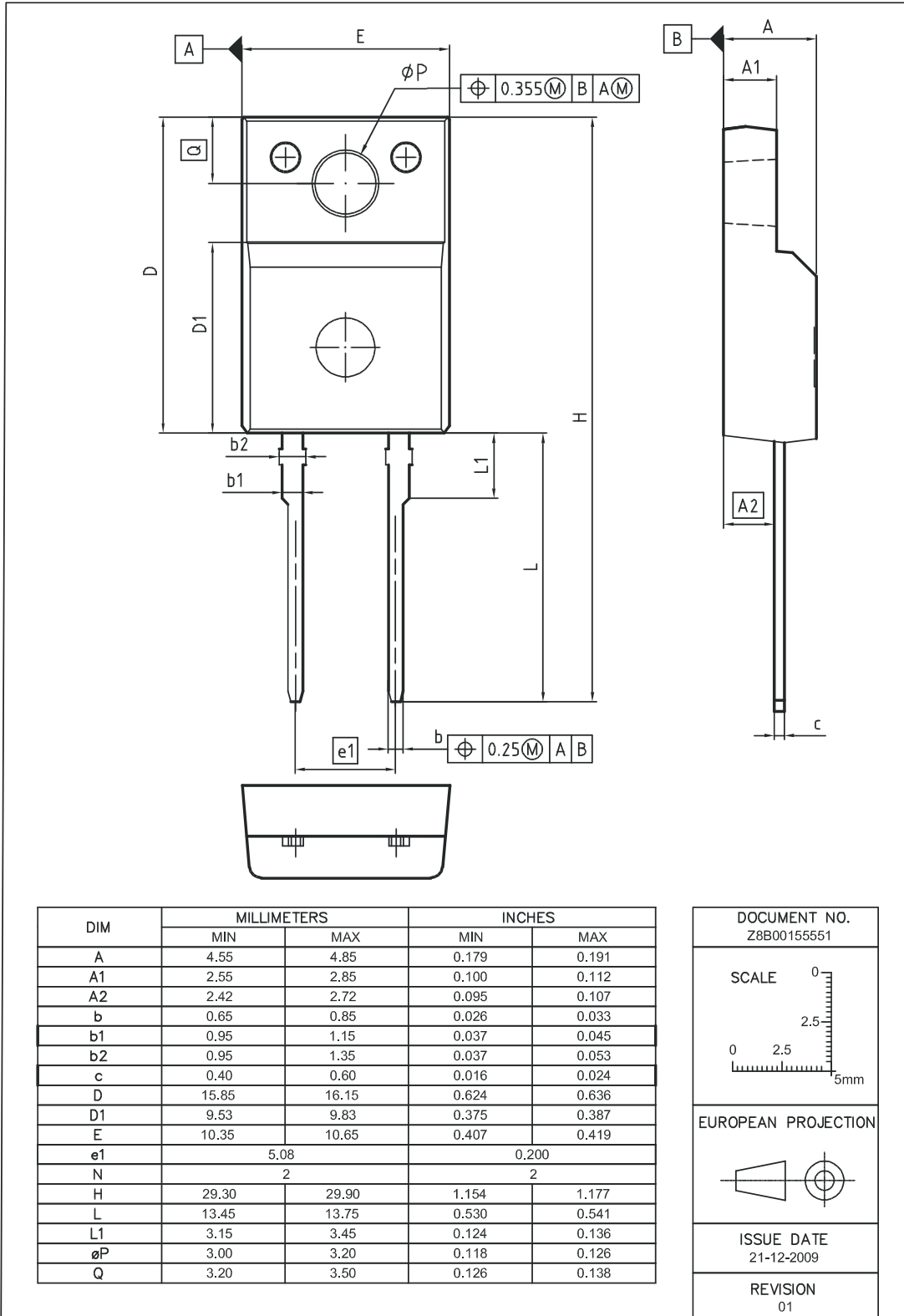


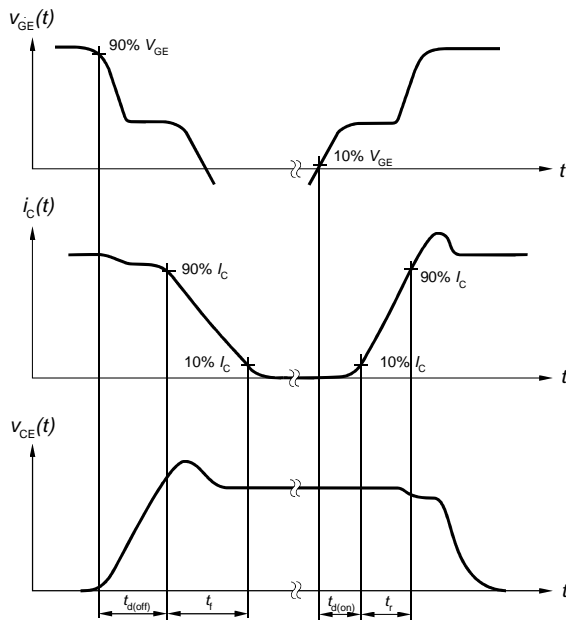


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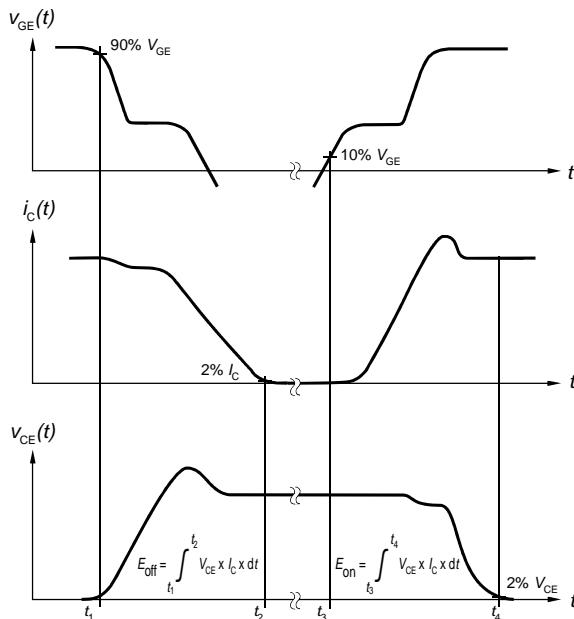
Emitter Controlled Diode

PG-TO220-2-22

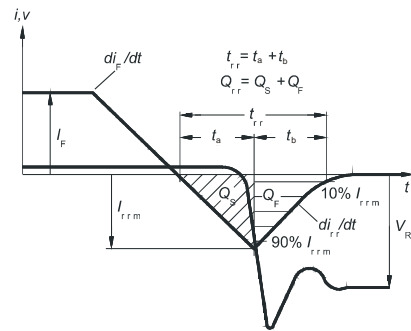




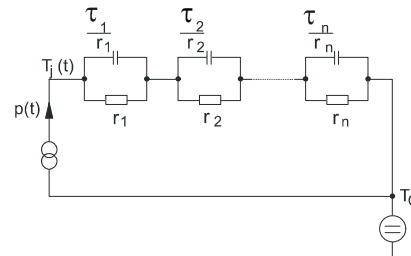
**Figure A. Definition of switching times**



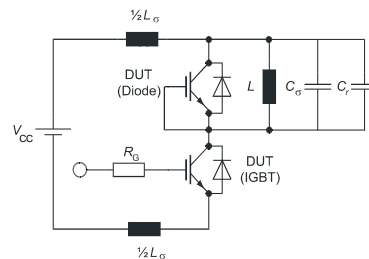
**Figure B. Definition of switching losses**



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



**Figure D. Thermal equivalent circuit**



**Figure E. Dynamic test circuit**  
 Parasitic inductance  $L_\sigma$ ,  
 Parasitic capacitor  $C_\sigma$ ,  
 Relief capacitor  $C_r$   
 (only for ZVT switching)



# IDV15E65D2

## Emitter Controlled Diode

### Revision History

IDV15E65D2

Revision: 2014-08-26, Rev. 2.2

#### Previous Revision

Revision	Date	Subjects (major changes since last revision)
1.1	2013-03-13	Preliminary data sheet
2.1	2013-12-16	Final DS / New Marking Pattern
2.2	2014-08-26	VFmax limit reduced according BE test and Qrr at 25°C corrected

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