

1. General description

Ultrafast power diode in a SOT404 (D2PAK) surface-mountable plastic package.

2. Features and benefits

- Fast switching
- High thermal cycling performance
- Low forward volt drop
- Low thermal resistance
- Soft recovery minimizes power-consuming oscillations
- Surface mountable package

3. Applications

- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)
- Output rectifiers in high-frequency switched-mode power supplies

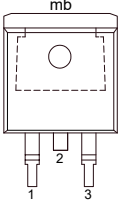
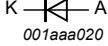
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_R	reverse voltage	DC	-	-	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 123\text{ °C}$; SQW; Fig. 1 ; Fig. 2	-	-	9	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 123\text{ °C}$; SQW	-	-	18	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; SIN	-	-	100	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; SIN	-	-	110	A
Static characteristics						
V_F	forward voltage	$I_F = 8\text{ A}$; $T_j = 150\text{ °C}$; Fig. 4	-	0.9	1.03	V
		$I_F = 8\text{ A}$; $T_j = 25\text{ °C}$; Fig. 4	-	1.05	1.25	V
		$I_F = 20\text{ A}$; $T_j = 25\text{ °C}$; Fig. 4	-	1.2	1.4	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $di_F/dt = 100\text{ A/s}$; $T_j = 25\text{ °C}$; Fig. 5 ; Fig. 6	-	50	60	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	no connection	 <p>D2PAK (SOT404)</p>	
2	K	cathode ^[1]		
3	A	anode		
mb	K	mounting base; cathode		

[1] it is not possible to make a connection to Pin 2 of the SOT404 package

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYV29B-500	D2PAK	plastic single-ended surface-mounted package (D2PAK); 3 leads (one lead cropped)	SOT404

7. Limiting values

Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage		-	500	V
V_{RWM}	crest working reverse voltage		-	500	V
V_R	reverse voltage	DC	-	500	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 123\text{ }^\circ\text{C}$; SQW; Fig. 1 ; Fig. 2	-	9	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 123\text{ }^\circ\text{C}$; SQW	-	18	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; SIN	-	100	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; SIN	-	110	A
T_{stg}	storage temperature		-40	150	$^\circ\text{C}$
T_j	junction temperature		-	150	$^\circ\text{C}$

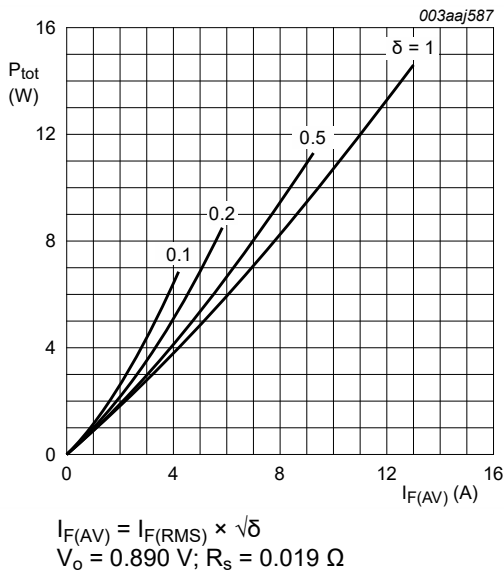


Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values

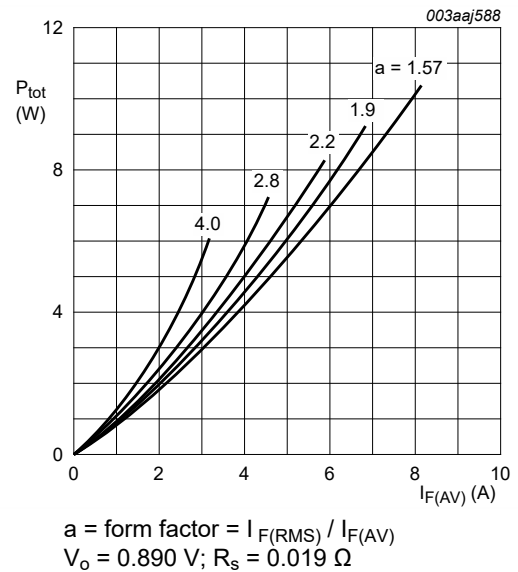


Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 3	-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	[1]	50	-	K/W

[1] Device mounted on a FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

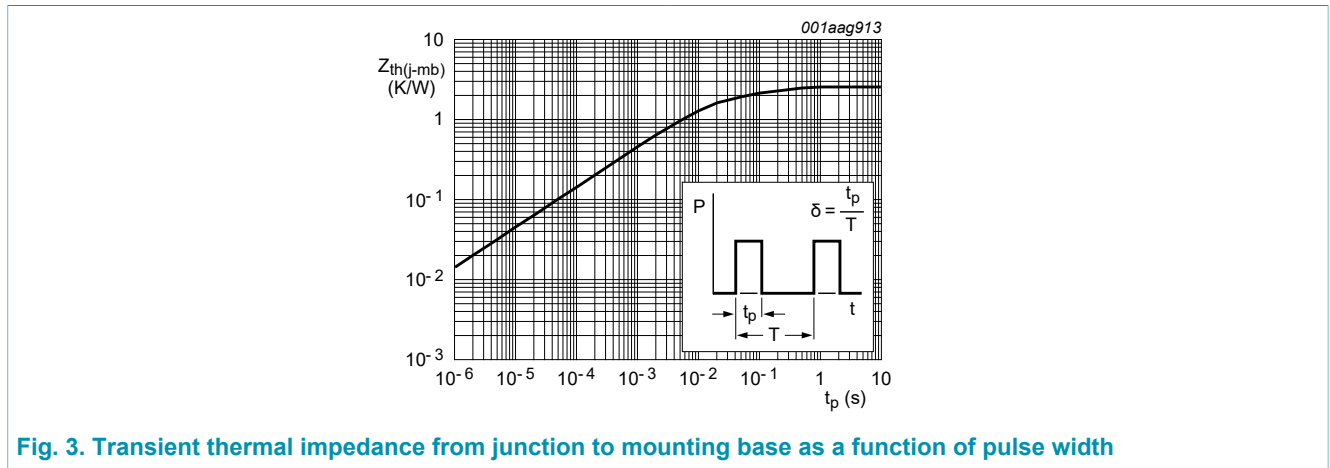
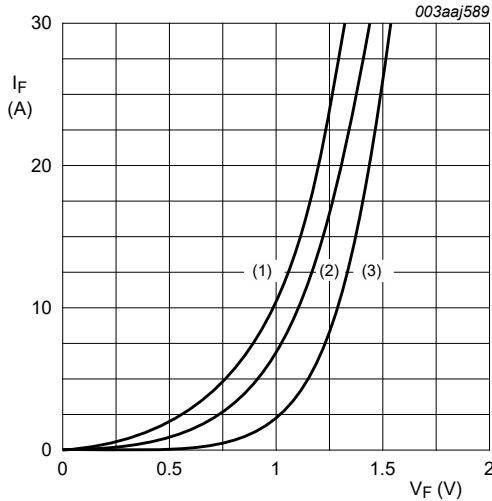


Fig. 3. Transient thermal impedance from junction to mounting base as a function of pulse width

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 8 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 4}$	-	0.9	1.03	V
		$I_F = 8 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 4}$	-	1.05	1.25	V
		$I_F = 20 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 4}$	-	1.2	1.4	V
I_R	reverse current	$V_R = 500 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	2	50	μA
		$V_R = 500 \text{ V}; T_j = 100 \text{ }^\circ\text{C}$	-	0.1	0.35	mA
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 100 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 5}; \text{ Fig. 6}$	-	50	60	ns
I_{RM}	peak reverse recovery current	$I_F = 10 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A/s}; T_j = 100 \text{ }^\circ\text{C}; \text{ Fig. 5}; \text{ Fig. 7}$	-	4	5.5	A
Q_r	recovered charge	$I_F = 2 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 20 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 8}; \text{ Fig. 5}$	-	40	60	nC
V_{FR}	forward recovery voltage	$I_F = 10 \text{ A}; dI_F/dt = 10 \text{ A/s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 9}$	-	2.5	-	V



$V_o = 0.890 \text{ V}; R_s = 0.019 \text{ } \Omega$
 (1) $T_j = 150 \text{ }^\circ\text{C};$ typical values
 (2) $T_j = 150 \text{ }^\circ\text{C};$ maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C};$ maximum values

Fig. 4. Forward current as a function of forward voltage

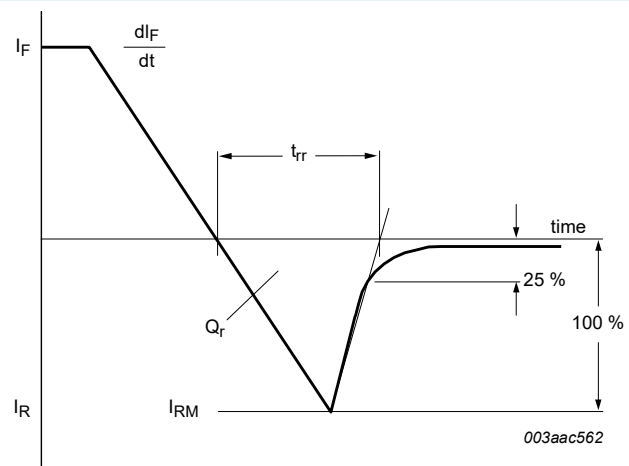
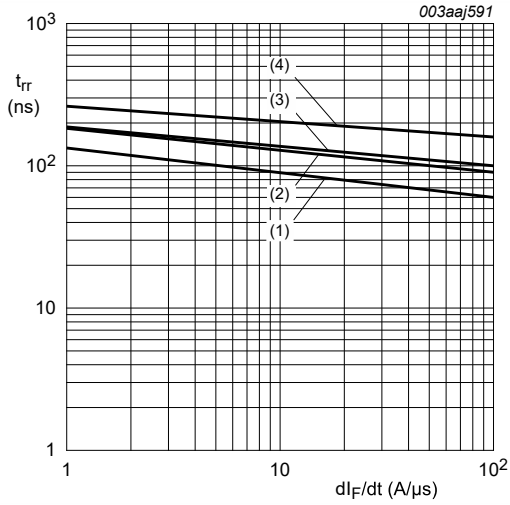
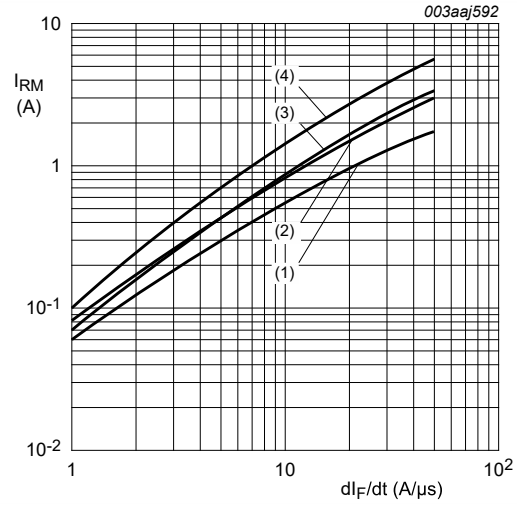


Fig. 5.



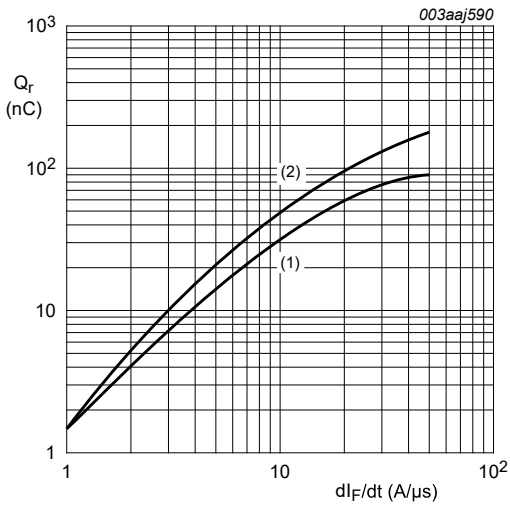
- (1) $I_F = 1$ A; $T_j = 25$ °C;
- (2) $I_F = 1$ A; $T_j = 100$ °C;
- (3) $I_F = 10$ A; $T_j = 25$ °C;
- (4) $I_F = 10$ A; $T_j = 100$ °C

Fig. 6. Reverse recovery time as a function of rate of change of forward current; maximum values



- (1) $I_F = 1$ A; $T_j = 25$ °C;
- (2) $I_F = 1$ A; $T_j = 100$ °C;
- (3) $I_F = 10$ A; $T_j = 25$ °C;
- (4) $I_F = 10$ A; $T_j = 100$ °C

Fig. 7. Peak reverse recovery current as a function of rate of change of forward current; maximum values



- (1) $I_F = 2$ A; $T_j = 25$ °C;
- (2) $I_F = 10$ A; $T_j = 25$ °C

Fig. 8. Recovered charge as a function of rate of change of forward current; maximum values

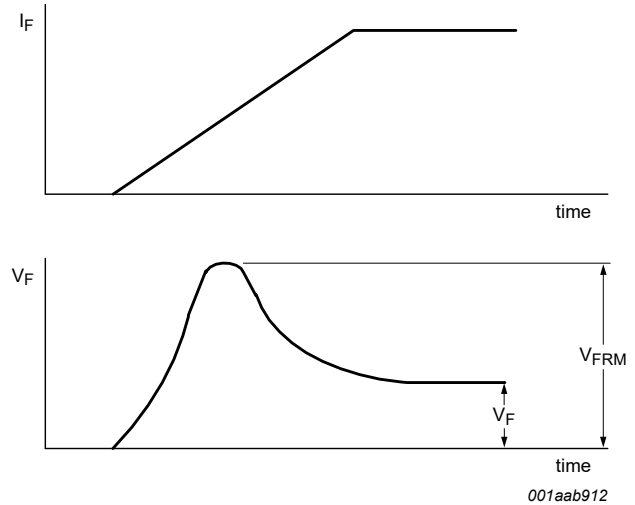


Fig. 9. Forward recovery definitions

10. Package outline

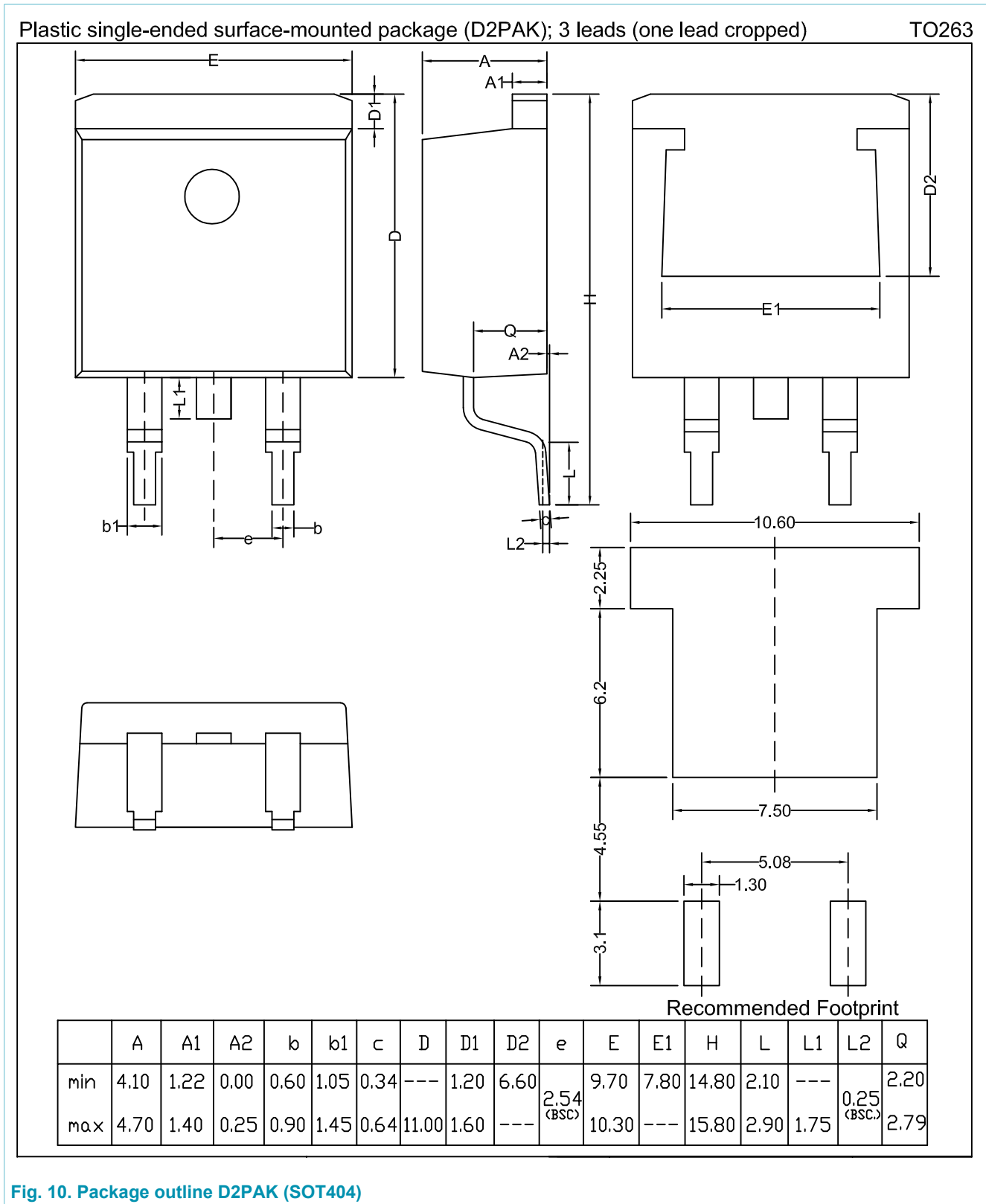


Fig. 10. Package outline D2PAK (SOT404)

11. Legal information

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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12. Contents

1. General description.....	1
2. Features and benefits.....	1
3. Applications.....	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Limiting values.....	3
8. Thermal characteristics.....	4
9. Characteristics.....	5
10. Package outline.....	7
11. Legal information.....	8

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