1 Characteristics

Table 1. Absolute maximum ratings (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	IEC 61000-4-2 (C = 150 pF, R = 330 Ω) Contact discharge Air discharge	 30 30	kV
P_{PP}	Peak pulse power dissipation	10/1000 µs, T_j initial = T_{amb}	400	W
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature range		-55 to +175	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C

Figure 1. Electrical characteristics - parameter definitions

V_{RM}	Maximum stand-off voltage
I_{RM}	Maximum leakage current @ V_{RM}
V_R	Stand-off voltage
I_R	Leakage current @ V_R
V_{BR}	Breakdown voltage @ I_{BR}
I_{BR}	Breakdown current
V_{CL}	Clamping voltage @ I_{PP}
I_{PP}	Peak pulse current
R_D	Dynamic resistance
V_F	Forward voltage drop @ I_F
I_F	Forward current
αT	Voltage temperature coefficient

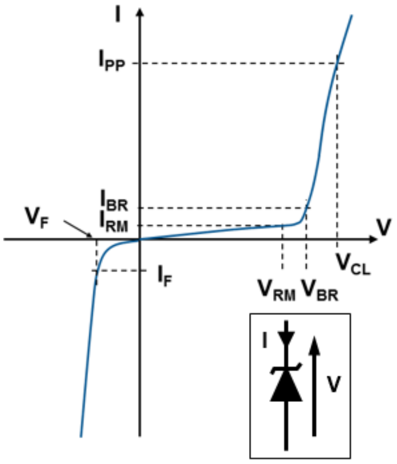


Figure 2. Pulse definition for electrical characteristics

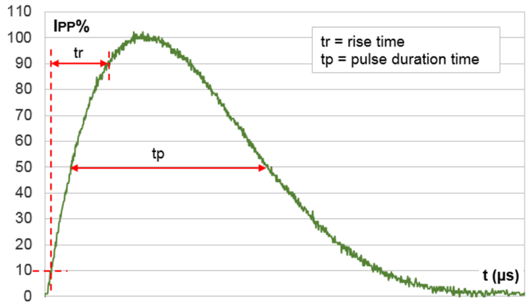


Table 2. Electrical characteristics - parameter values (T_{amb} = 25 °C, unless otherwise specified)

Type	I_{RM} max at V_{RM}			V_{BR} at I_{BR}[1]				10 / 1000 µs			8 / 20 µs			αT
								V_{CL}[2][3]	I_{PP}[4]	R_D	V_{CL}[2][3]	I_{PP}[4]	R_D	
	25 °C	85 °C		Min.	Typ.	Max.		Max.		Max.	Max.		Max.	Max.
	µA		V	V			mA	V	A	Ω	V	A	Ω	10^{-4}/°C
SMM4F5.0A	10	50	5.0	6.46	6.80	7.14	10	9.2	43.5	0.047	13.4	179	0.035	5.7
SMM4F6.0A	10	50	6.0	6.65	7.00	7.35	10	10.3	38.8	0.076	13.7	175	0.036	5.9
SMM4F6.5A	10	50	6.5	7.13	7.50	7.88	10	11.2	35.7	0.093	14.5	166	0.040	6.1
SMM4F8.5A	10	50	8.5	9.5	10.0	10.5	1	14.4	27.7	0.141	19.5	140	0.064	7.3
SMM4F10A	0.2	1	10	11.4	12.0	12.6	1	17.0	23.5	0.188	21.7	127	0.072	7.8
SMM4F12A	0.2	1	12	13.3	14.0	14.7	1	19.9	20.1	0.259	25.3	112	0.095	8.3
SMM4F13A	0.2	1	13	14.3	15.0	15.8	1	21.5	18.6	0.306	27.2	106	0.108	8.4
SMM4F15A	0.2	1	15	17.1	18.0	18.9	1	24.4	16.4	0.335	32.5	90	0.151	8.8
SMM4F18A	0.2	1	18	20.9	22.0	23.1	1	29.2	14.0	0.436	39.3	76	0.213	9.2
SMM4F20A	0.2	1	20	22.8	24.0	25.2	1	32.4	12.0	0.600	42.8	70	0.250	9.4
SMM4F24A	0.2	1	24	26.6	28.0	29.4	1	38.9	9.5	1.00	50	61	0.338	9.6
SMM4F26A	0.2	1	26	28.5	30.0	31.5	1	42.1	9.0	1.18	53.5	58	0.380	9.7
SMM4F28A	0.2	1	28	31.4	33.0	34.7	1	45.4	8.0	1.34	59	53	0.458	9.8
SMM4F33A	0.2	1	33	37.1	39.0	41.0	1	53.3	7.0	1.76	69.7	45	0.638	10

1. *To calculate* V_{BR} *versus* T_j: V_{BR} *at* T_J = V_{BR} *at 25 °C x (1 + αT x (*T_j *- 25))*
2. *To calculate* V_{CL} *versus* T_j: V_{CL} *at* T_J = V_{CL} *at 25 °C x (1 + αT x (*T_j *- 25))*
3. *To calculate* V_{CLmax} *versus* $I_{PPappli}$: $V_{CLmax} = V_{BR\ max} + R_D \times I_{PPappli}$
4. *Surge capability given for both directions*

1.1 Characteristics (curves)

Figure 3. **Maximum peak power dissipation versus initial junction temperature**

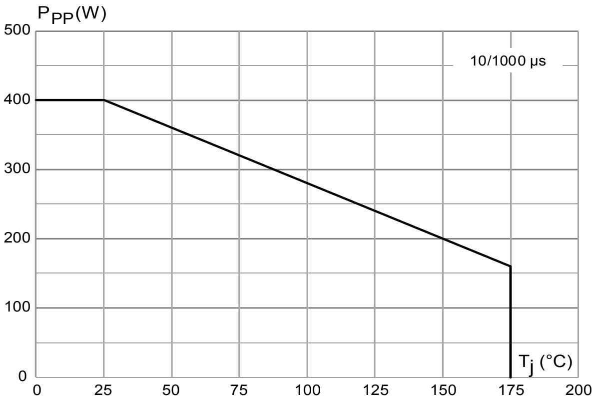


Figure 4. **Maximum peak pulse power versus exponential pulse duration**

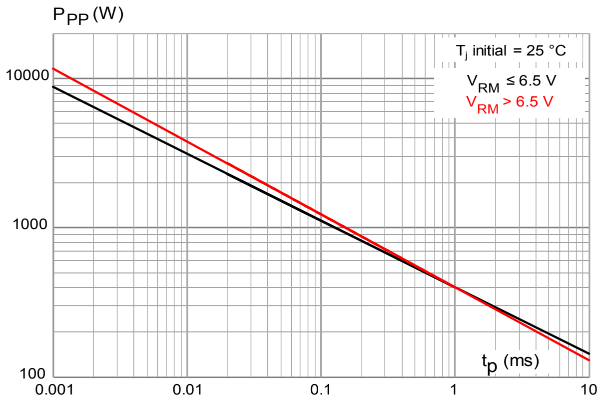


Figure 5. **Maximum clamping voltage versus peak pulse current**

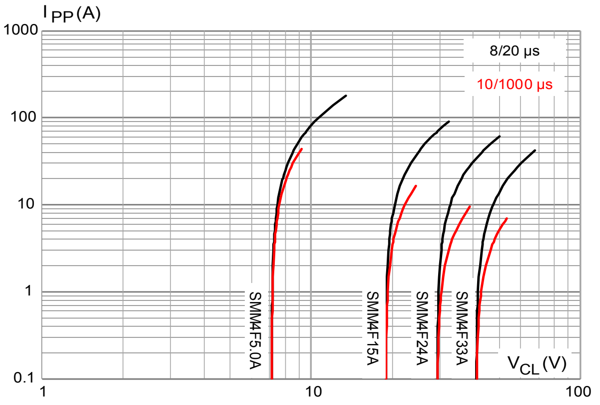


Figure 6. **Dynamic resistance versus pulse duration**

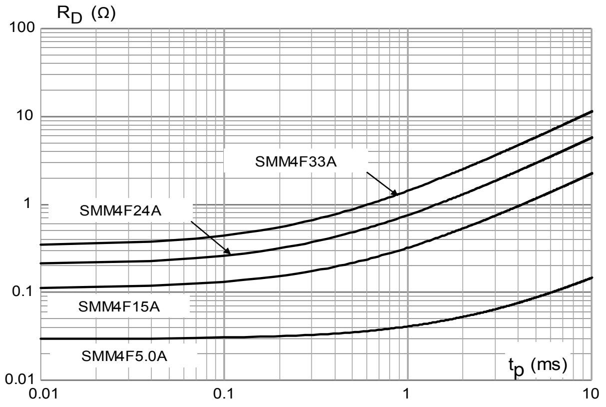


Figure 7. **Junction capacitance versus reverse applied voltage**

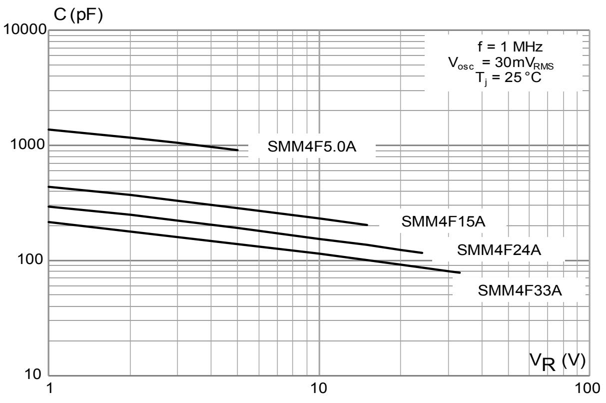


Figure 8. **Leakage current versus junction temperature**

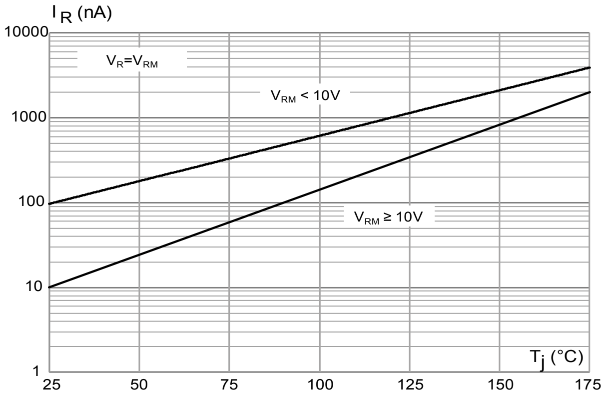


Figure 9. Peak forward voltage drop versus peak forward current

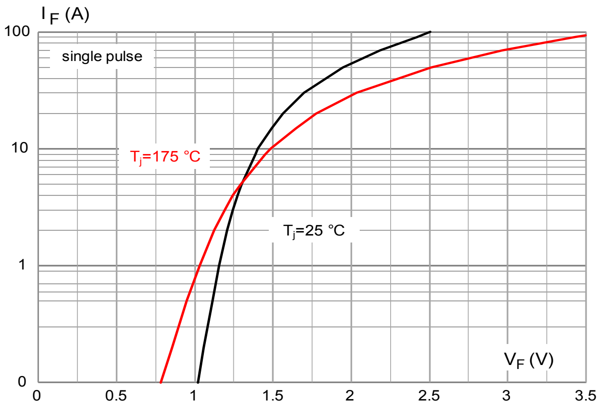


Figure 10. Thermal impedance junction to ambient versus pulse duration

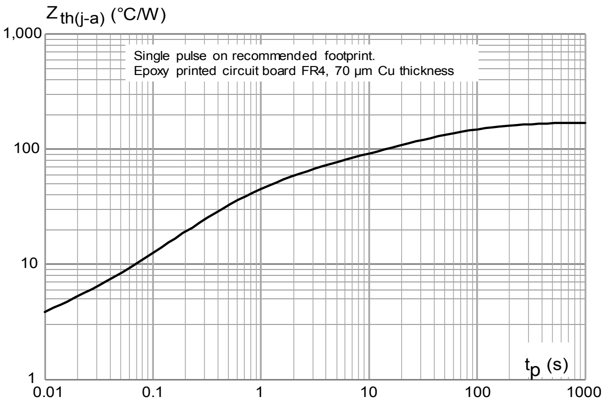
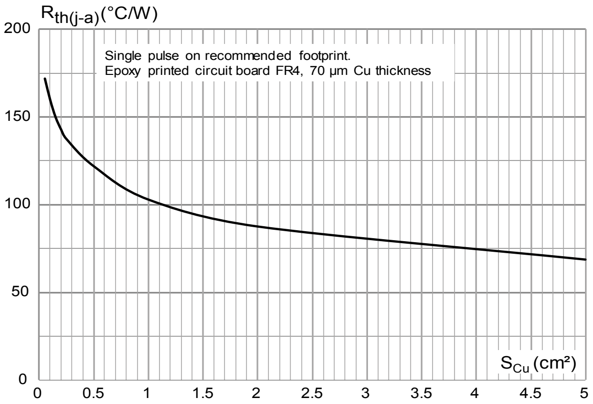


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

2.1 STmite Flat package information

Figure 12. STmite Flat package outline

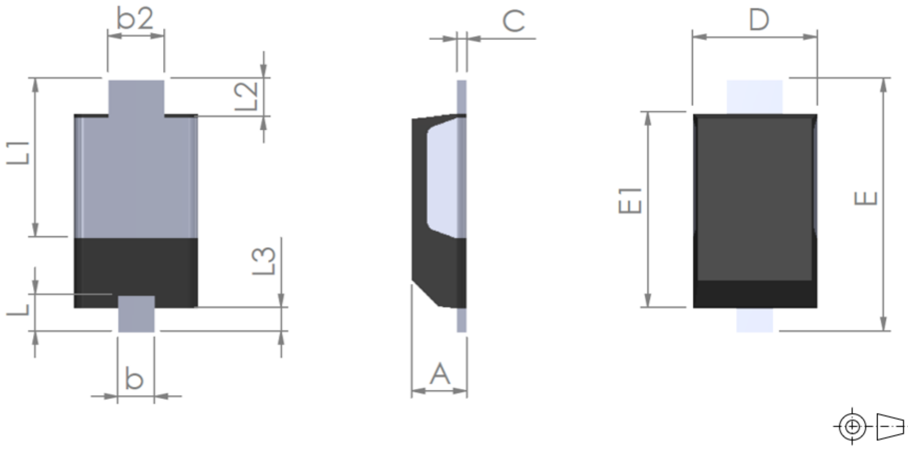


Table 3. STmite Flat mechanical data

Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80	0.85	0.95	0.031	0.033	0.038
b	0.40	0.55	0.65	0.015	0.022	0.026
b2	0.70	0.85	1.00	0.027	0.033	0.040
c	0.10	0.15	0.25	0.003	0.006	0.010
D	1.75	1.90	2.05	0.068	0.075	0.081
E	3.60	3.80	3.90	0.141	0.150	0.154
E1	2.80	2.95	3.10	0.110	0.116	0.123
L	0.50	0.55	0.80	0.019	0.022	0.032
L1	2.10	2.40	2.60	0.082	0.094	0.103
L2	0.45	0.60	0.75	0.017	0.024	0.030
L3	0.20	0.35	0.50	0.007	0.014	0.020

Figure 13. Footprint recommendations, dimensions in mm (inches)

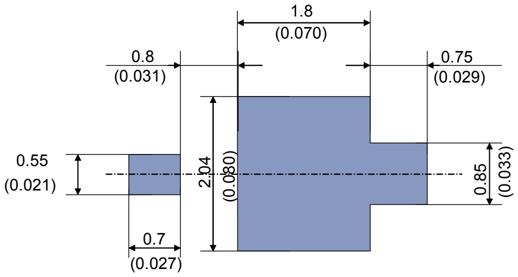
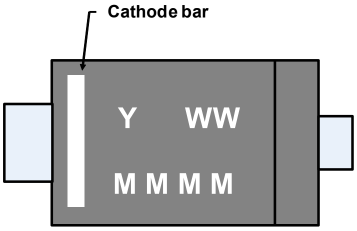
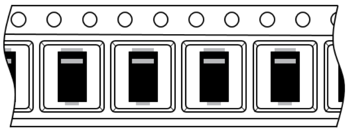


Figure 14. Marking layout (refer to ordering information table for marking)



MMMM : Marking
Y : Year
WW : week

Figure 15. Package orientation in reel



Taped according to EIA-481
Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package
On bidirectional devices, marking and logo may
be not always in the same direction

Figure 16. Tape and reel orientation

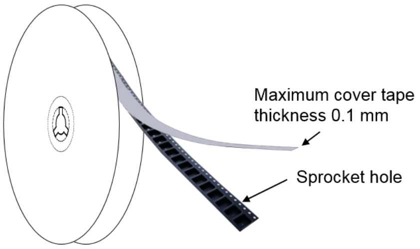


Figure 17. Reel dimensions (mm)

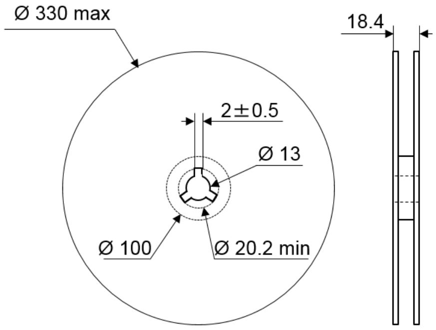
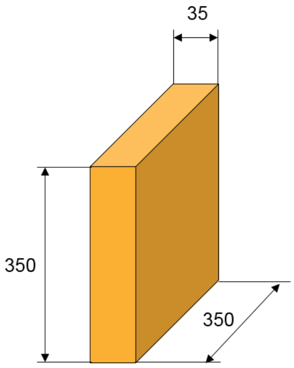
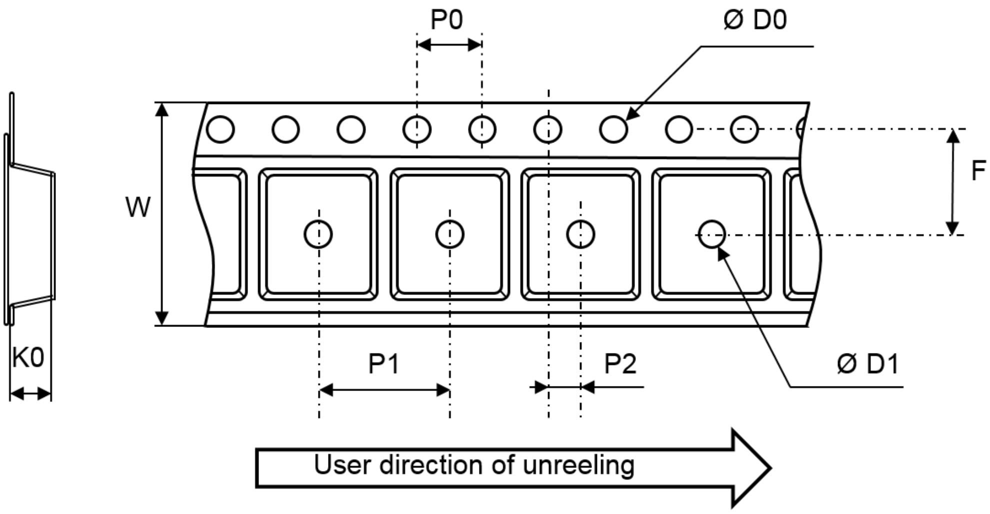


Figure 18. Inner box dimensions (mm)





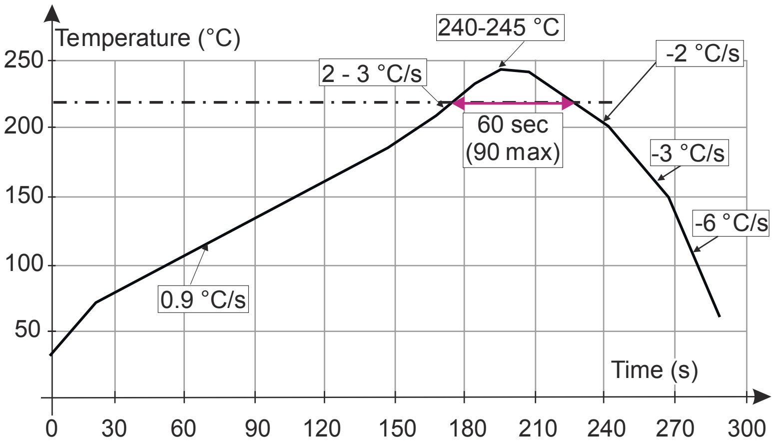
Note: Pocket dimensions are not on scale
Pocket shape may vary depending on package

Figure 19. Tape and reel outline

Table 4. Tape and reel mechanical data

Ref.	Dimensions		
	Millimeters		
	Min.	Typ.	Max.
P0	3.9	4	4.1
P1	3.9	4	4.1
P2	1.9	2	2.1
ØD0	1.5	1.55	1.6
ØD1	1.5		
F	5.4	5.5	5.6
K0	1.0	1.1	1.2
W	11.7	12	12.3

Figure 20. **ST ECOPACK recommended soldering reflow profile for PCB mounting**



3 Ordering information

Figure 21. Ordering information scheme

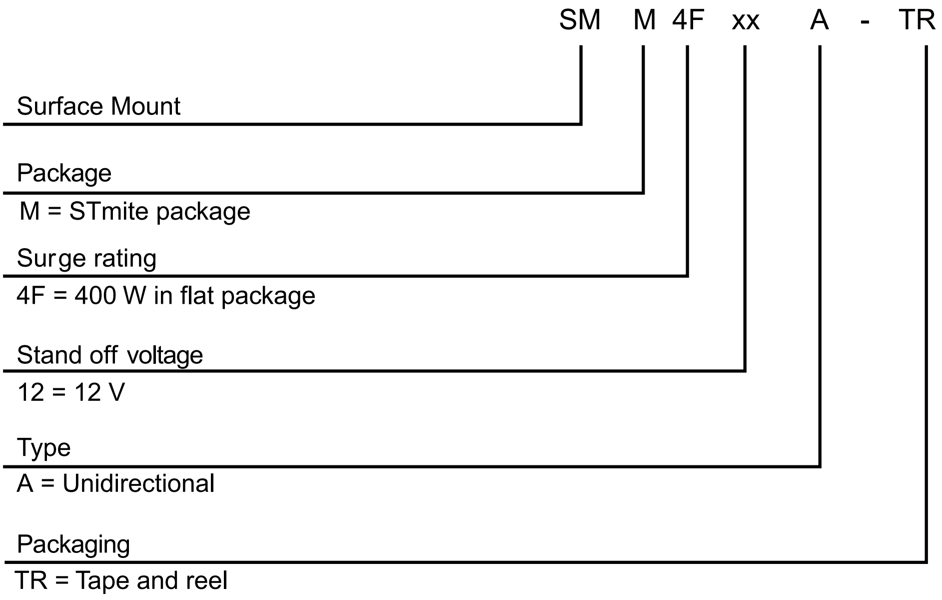


Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty.	Delivery mode
SMM4FxxA-TR	See Table 6. Marking.	STmite Flat	16 mg	12000	Tape and reel

Table 6. **Marking**

Order code	Marking
SMM4F5.0A-TR	4UA
SMM4F6.0A-TR	4UB
SMM4F6.5A-TR	4UC
SMM4F8.5A-TR	4UD
SMM4F10A-TR	4UE
SMM4F12A-TR	4UF
SMM4F13A-TR	4UG
SMM4F15A-TR	4UH
SMM4F18A-TR	4UJ
SMM4F20A-TR	4UK
SMM4F24A-TR	4UM
SMM4F26A-TR	4UN
SMM4F28A-TR	4UO
SMM4F33A-TR	4UQ

Revision history

Table 7. **Document revision history**

Date	Version	Changes
29-Nov-2007	1	First issue.
19-Dec-2007	2	Updated I_{PP} and R_D parameters in columns 10 and 11 of Table 4.
19-Aug-2014	3	Updated package name.
19-Jan-2017	4	Updated cover page and Table 4.
03-Mar-2020	5	Updated document title, Section Description, Section 1 Characteristics and Section 1.1 Characteristics (curves).
15-Apr-2020	6	Updated Figure 5 and Figure 11.

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