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SiC

Silicon Carbide Diode

thinQ!™ SiC Schottky Diode

1200V SiC Schottky Diode

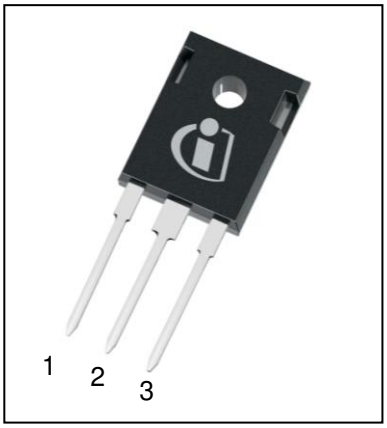
IDW30S120

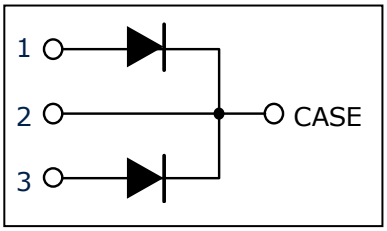
Final Datasheet

Rev. 2.0,<2012-03-23>

Power Management & Multimarket

1 Description





The 1200V family of Infineon SiC Schottky diodes has emerged over the years as the industry standard and is now being extended with the IDWxxS120 product family in the TO247 package.

The very good thermal characteristics of the TO247 in combination with the low V_f of the 1200V diodes make it particularly suitable in power applications where relatively high currents are demanded and utmost efficiency is required. With the introduction of this package, Infineon now offers a current capability of up to 30A in the 1200V range.

Features

- Revolutionary semiconductor material - Silicon Carbide
- Benchmark switching behavior
- No reverse recovery/ No forward recovery
- Temperature independent switching behavior
- High surge current capability
- Pb-free lead plating; RoHS compliant
- Qualified according to JEDEC[1)] for target applications
- Optimized for high temperature operation

Benefits

- System efficiency improvement over Si diodes
- System cost / size savings due to reduced cooling requirements
- Enabling higher frequency / increased power density solutions
- Higher system reliability due to lower operating temperatures
- Reduced EMI

Applications

- SMPS e.g.; CCM PFC
- Solar applications; UPS; Motor Drives

Table 1 Key Performance Parameters

Parameter	Value (leg/device)	Unit
V_{DC}	1200	V
Q_C @ V_R=400V	55/110	nC
I_F @ T_c < 135°C	15/30	A

Table 2 Pin Definition

Pin 1	Pin 2	Pin 3
A	C	A

Type / ordering Code	Package	Marking	Related links
IDW30S120	PG-TO247-3	D30S120	www.infineon.com/sic

1) J-STD20 and JESD22

Table of Contents

2 Maximum ratings

Table 3 Maximum ratings

Parameter	Symbol	Values (leg/device)			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Continuous forward current	I_F	–	–	15/30	A	T_C < 135°C, D=1
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	–	–	73/146		T_C = 25°C, t_p=10 ms
		–	–	58/116		T_C = 150°C, t_p=10 ms
Non-repetitive peak forward current	$I_{F,max}$	–	–	389/778		T_C = 25°C, t_p=10 µs
i²t value	$\int i^2dt$	–	–	27/106	A²s	T_C = 25°C, t_p=10 ms
		–	–	17/68		T_C = 150°C, t_p=10 ms
Repetitive peak reverse voltage	V_{RRM}	–	–	1200	V	
Diode dv/dt ruggedness	dv/dt	–	–	50	V/ns	V_R=0..480 V
Power dissipation	P_{tot}	–	–	150/300	W	T_C = 25°C
Operating and storage temperature	T_j;T_{stg}	-55	–	175	°C	
Mounting torque		–	–	60	Ncm	M3 and M3.5 screws

3 Thermal characteristics

Table 4 Thermal characteristics TO-247-3

Parameter	Symbol	Values (leg/device)			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Thermal resistance, junction-case	R_{thJC}	–	–	1.0/0.5	K/W	
Thermal resistance, junction-ambient	R_{thJA}	–	–	62		leaded
Soldering temperature, wavesoldering only allowed at leads	T_{sold}	–	–	260	°C	1.6mm (0.063 in.) from case for 10 s

4 Electrical characteristics

Table 5 Static characteristics

Parameter	Symbol	Values (leg/device)			Unit	Note/Test Condition
		Min.	Typ.	Max.		
DC blocking voltage	V_{DC}	1200	–	–	V	I_R = 0.61 mA, T_j = 25°C
Diode forward voltage	V_F	–	1.5	1.8		I_F= 30 A, T_j=25°C
		–	2.4	–		I_F= 30 A, T_j=150°C
Reverse current	I_R	–	15/30	305/610	µA	V_R=1200 V, T_j=25°C
		–	30/60	1500/3000		V_R=1200 V, T_j=150°C

Table 6 AC characteristics

Parameter	Symbol	Values (leg/device)			Unit	Note/Test Condition
		Min.	Typ.	Max.		
Total capacitive charge	Q_c	–	55/110	–	nC	V_R=400 V, *di/dt*=200A/µs, $I_F \le I_{F,MAX}$, T_j=150°C.
			84/168			V_R=1000 V, *di/dt*=200A/µs, $I_F \le I_{F,MAX}$, T_j=150°C.
Total Capacitance	C	–	870/1740	–	pF	V_R=1 V, f=1 MHz
		–	75/150	–		V_R=300 V, f=1 MHz
		–	60/120	–		V_R=600 V, f=1 MHz

5 Electrical characteristics diagrams

Table 7

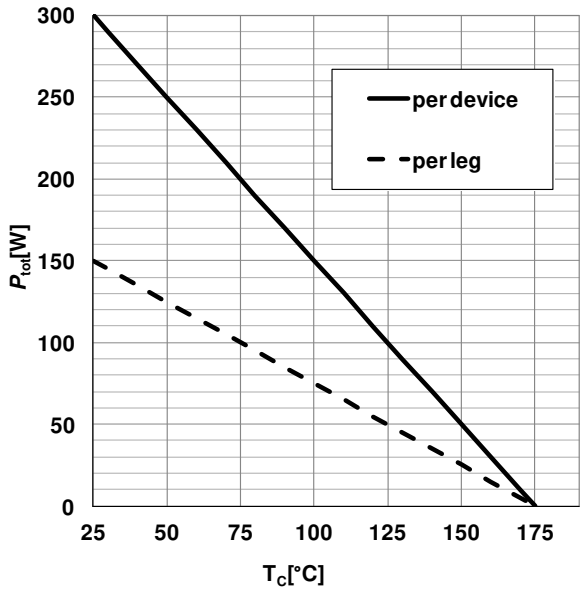
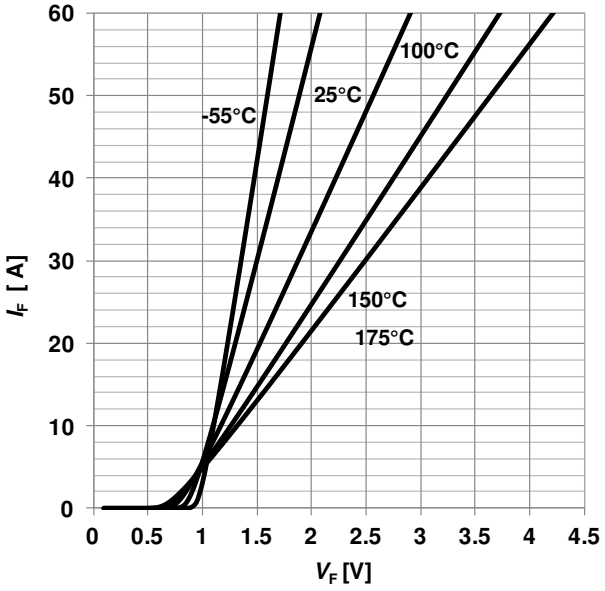
Power dissipation	Typical forward characteristics (per device)
	
$P_{tot}=f(T_C)$; $R_{thJC,max}$	$I_F=f(V_F)$; $t_p=200$ µs; parameter: T_j

Table 8

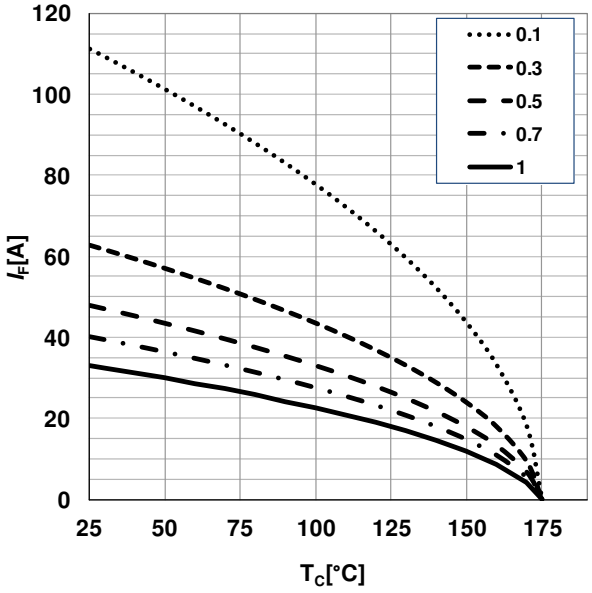
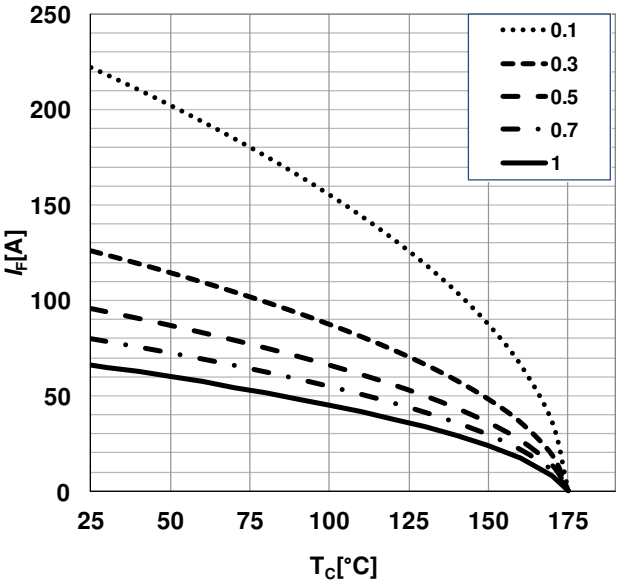
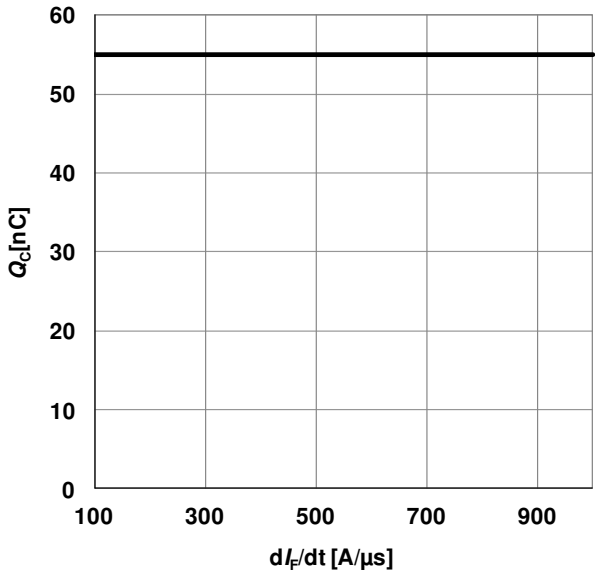
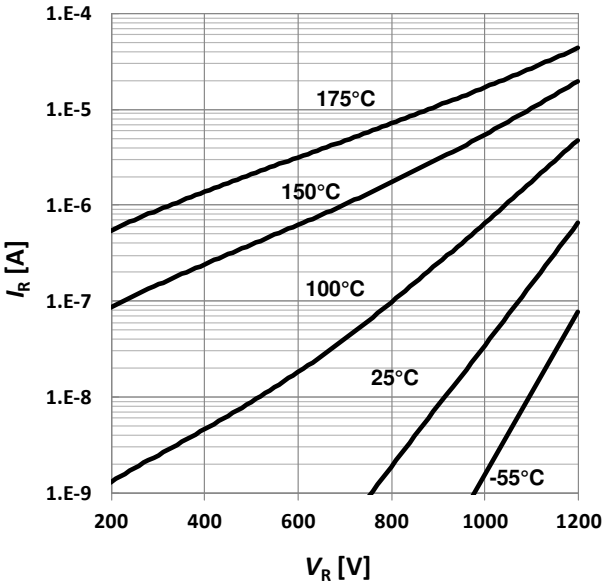
Diode forward current (per leg)	Diode forward current (per device)
	
$I_F=f(T_C)$; $T_j\leq175$°C; $R_{thJC,max}$; parameter D=duty cycle	$I_F=f(T_C)$; $T_j\leq175$°C; $R_{thJC,max}$; parameter D=duty cycle

Table 9

Typ. capacitance charge vs. current slope[1] (per leg)	Typ. reverse current vs. reverse voltage (per leg)
	
Q_C=f(di$_F$/dt); V_R=400V; T_j=150°C; $I_F \leq I_{F,max}$; per device the values double	I_R=f(V_R); parameter: T_j; per device the values double

1) Only capacitive charge, guaranteed by design.

Table 10

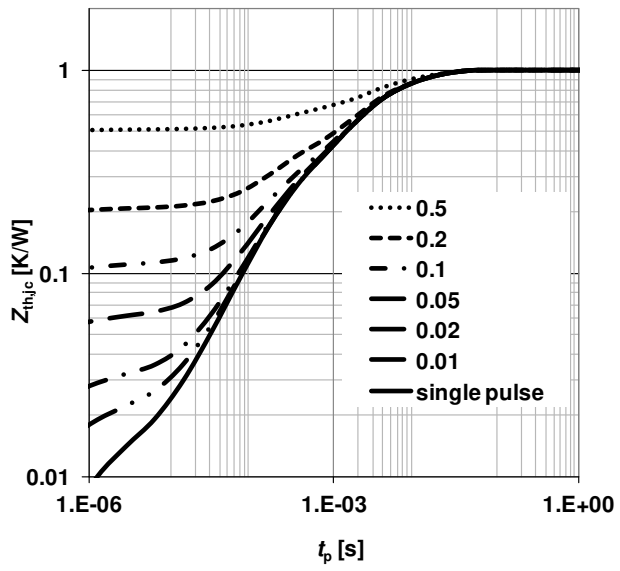
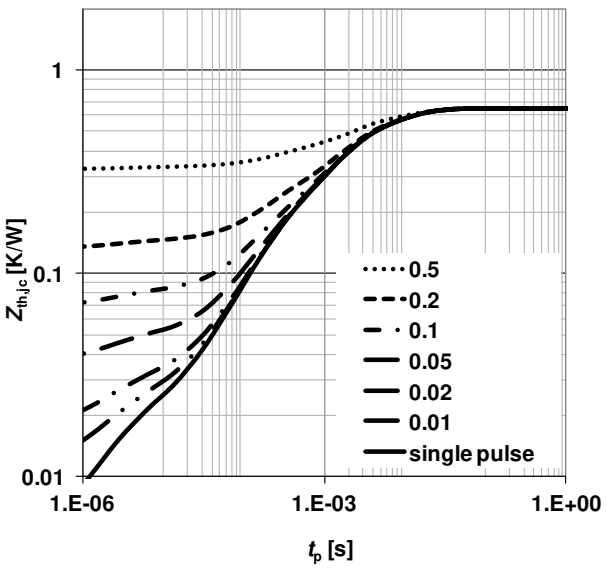
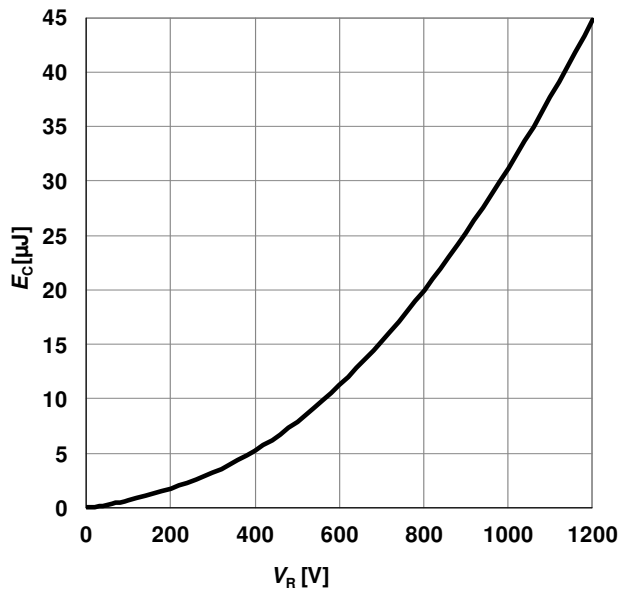
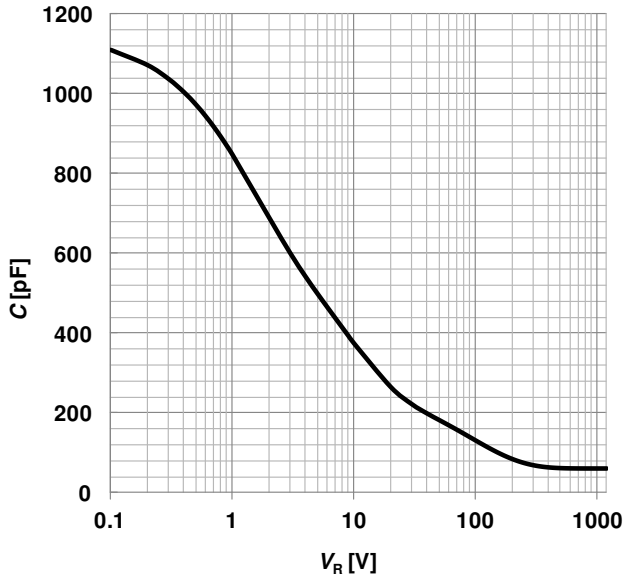
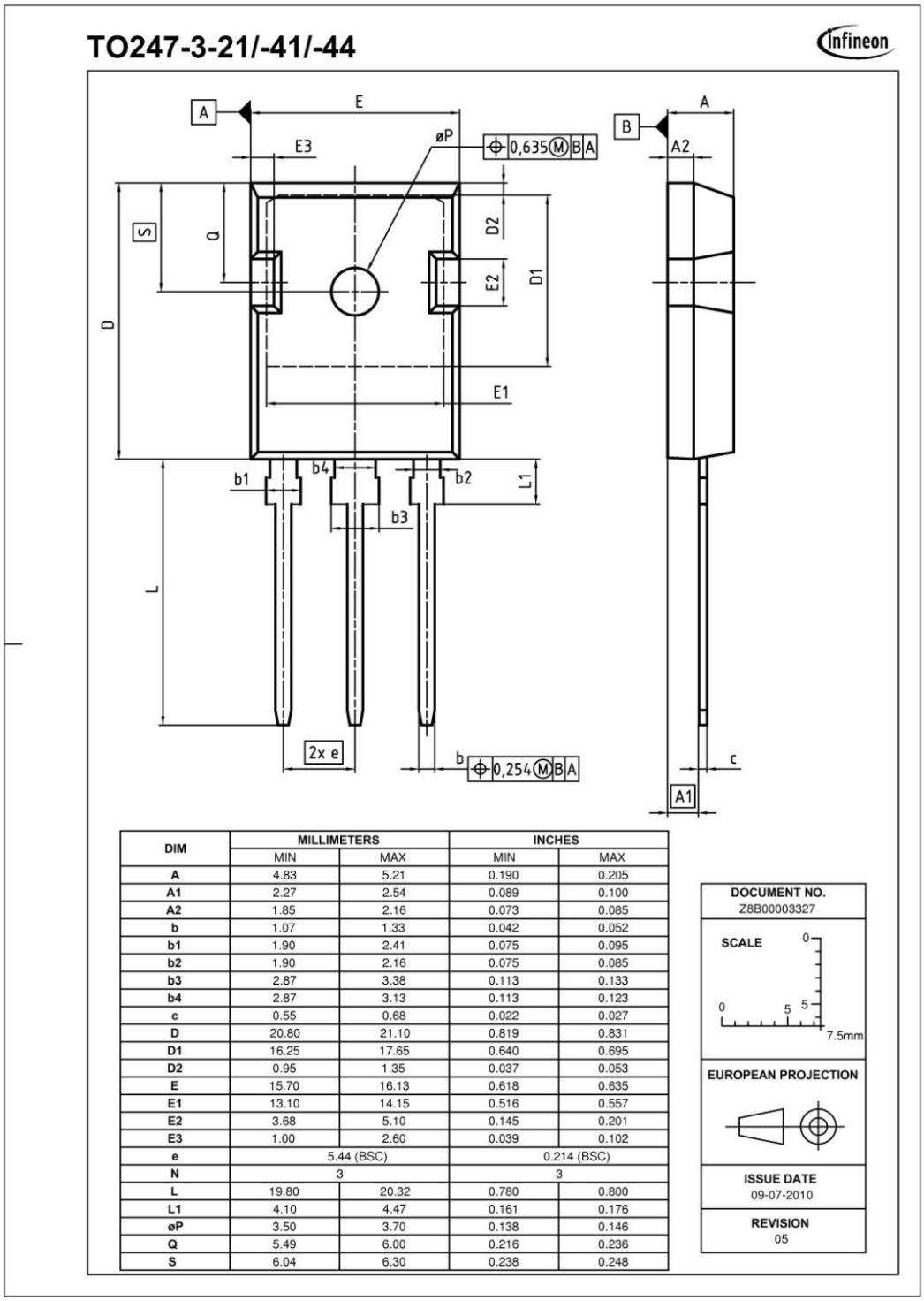
Max. transient thermal impedance (per leg)	Max. transient thermal impedance (per device)
	
$Z_{th,jc}$=f(t_P); parameter: D=t_P/T	$Z_{th,jc}$=f(t_P); parameter: D=t_P/T

Table 11

Typ. capacitance stored energy (per leg)	Typ. capacitance vs. reverse voltage (per leg)
	
E_C=f(V_R); per device the values double	C=f(V_R); T_j=25°C; f=1 MHz; per device the values double

6 Package outlines



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

Figure 1 Outlines TO-247, dimensions in mm/inches

7 Revision History

thinQ!™ SiC Schottky Diode

Revision History: 2012-03-23, Rev. 2.0

Previous Revision:

Revision	Subjects (major changes since last version)

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