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-- ----- PROOF -----
-- Length of proof is 275.Level of proof is 65 .
-- 1 [ ]  $c2 \neq c1 \vee c2 \cap c1 \cup \overline{c2} \cap \overline{c1} \neq \mathbb{1}$ 
-- 2 [ ]  $x \cup y = y \cup x$ 
-- 3 [ ]  $x \cup (y \cup z) = x \cup y \cup z$ 
-- 5,4 [ copy,3,flip.1 ]  $x \cup y \cup z = x \cup (y \cup z)$ 
-- 6 [ ]  $\overline{x \cup y} = \overline{x} \cap \overline{y}$ 
-- 8 [ ]  $x \cap y = \overline{\overline{x} \cup \overline{y}}$ 
-- 10,9 [ copy,8,flip.1 ]  $\overline{\overline{x} \cup \overline{y}} = x \cap y$ 
-- 11 [ ]  $\delta = \overline{\iota}$ 
-- 13,12 [ copy,11,flip.1 ]  $\overline{\iota} = \delta$ 
-- 14 [ ]  $\mathbb{1} = \iota \cup \delta$ 
-- 16,15 [ copy,14,flip.1 ]  $\iota \cup \delta = \mathbb{1}$ 
-- 17 [ ]  $\emptyset = \overline{\mathbb{1}}$ 
-- 19,18 [ copy,17,flip.1 ]  $\overline{\mathbb{1}} = \emptyset$ 
-- 20 [ ]  $c2 = c1 \vee c2 \cap c1 \cup \overline{c2} \cap \overline{c1} = \mathbb{1}$ 
-- 21 [ back_demod,6,demod,10 ]  $\overline{\overline{x \cup y} \cup x \cap y} = x$ 
-- 24 [ para_from,2.1.1,1.2.1 ]  $c2 \neq c1 \vee c2 \cap c1 \cup \overline{c2} \cap \overline{c1} \neq \mathbb{1}$ 

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-- 27 [ para_into,4.1.1.1,2.1.1,demod,5 ]  $x \cup (y \cup z) = y \cup (x \cup z)$ 
-- 28 [ para_into,4.1.1,2.1.1 ]  $x \cup (y \cup z) = y \cup (z \cup x)$ 
-- 29 [ copy,28,flip.1 ]  $x \cup (y \cup z) = z \cup (x \cup y)$ 
-- 32,31 [ para_into,15.1.1,2.1.1 ]  $\delta \cup \iota = \mathbb{1}$ 
-- 34,33 [ para_from,15.1.1,4.1.1.1 ]  $\mathbb{1} \cup x = \iota \cup (\delta \cup x)$ 
-- 36,35 [ para_into,9.1.1.1.1,18.1.1 ]  $\emptyset \cup \bar{x} = \mathbb{1} \cap x$ 
-- 38,37 [ para_into,9.1.1.1.1,12.1.1 ]  $\delta \cup \bar{x} = \iota \cap x$ 
-- 39 [ para_into,9.1.1.1.1,9.1.1 ]  $x \cap y \cup \bar{z} = (\bar{x} \cup \bar{y}) \cap z$ 
-- 42,41 [ para_into,9.1.1.1.2,18.1.1 ]  $\bar{x} \cup \emptyset = x \cap \mathbb{1}$ 
-- 43 [ para_into,9.1.1.1.2,12.1.1 ]  $\bar{x} \cup \delta = x \cap \iota$ 
-- 45 [ para_into,9.1.1.1.2,9.1.1 ]  $\bar{x} \cup y \cap z = x \cap (\bar{y} \cup \bar{z})$ 
-- 47 [ para_into,9.1.1.1,2.1.1,demod,10 ]  $x \cap y = y \cap x$ 
-- 51 [ para_into,33.1.1,2.1.1 ]  $x \cup \mathbb{1} = \iota \cup (\delta \cup x)$ 
-- 52 [ copy,51,flip.1 ]  $\iota \cup (\delta \cup x) = x \cup \mathbb{1}$ 
-- 56,55 [ para_into,35.1.1.1.2,18.1.1 ]  $\emptyset \cup \emptyset = \mathbb{1} \cap \mathbb{1}$ 
-- 57 [ para_into,35.1.1.1.2,12.1.1 ]  $\emptyset \cup \delta = \mathbb{1} \cap \iota$ 
-- 60,59 [ para_into,35.1.1.1.2,9.1.1 ]  $\emptyset \cup x \cap y = \mathbb{1} \cap (\bar{x} \cup \bar{y})$ 
-- 63 [ para_into,20.2.1.2,47.1.1 ]  $c2 = c1 \vee c2 \cap c1 \cup \bar{c1} \cap c2 = \mathbb{1}$ 
-- 64 [ para_into,20.2.1,2.1.1 ]  $c2 = c1 \vee \bar{c2} \cap \bar{c1} \cup c2 \cap c1 = \mathbb{1}$ 

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-- 68 [ para\_into,57.1.1.1,2.1.1 ]  $\overline{\delta U \emptyset} = \mathbb{1} \cap \iota$   
-- 83,82 [ para\_into,37.1.1.1.2,12.1.1 ]  $\overline{\delta U \delta} = \iota \cap \iota$   
-- 88 [ para\_into,21.1.1.1.1.1,55.1.1 ]  $\mathbb{1} \cap \mathbb{1} \cup x \cup (\emptyset \cup \emptyset) \cap x = \emptyset \cup \emptyset$   
-- 94 [ para\_into,21.1.1.1.1.1,18.1.1 ]  $\overline{\emptyset \cup x} \cup \mathbb{1} \cap x = \mathbb{1}$   
-- 96 [ para\_into,21.1.1.1.1.1,12.1.1 ]  $\overline{\delta \cup x} \cup \iota \cap x = \iota$   
-- 98 [ para\_into,21.1.1.1.1.1,9.1.1 ]  $\overline{x \cap y} \cup z \cup (\overline{x} \cup \overline{y}) \cap z = \overline{x} \cup \overline{y}$   
-- 102 [ para\_into,21.1.1.1.1,2.1.1 ]  $x \cup \overline{y} \cup y \cap x = y$   
-- 104 [ para\_into,21.1.1.1,9.1.1 ]  $x \cap y \cup x \cap \overline{y} = x$   
-- 106 [ para\_into,21.1.1.2,47.1.1 ]  $\overline{x} \cup y \cup y \cap x = x$   
-- 108 [ para\_into,21.1.1,21.1.1 ]  $x = x$   
-- 109 [ para\_into,21.1.1,2.1.1 ]  $x \cap y \cup \overline{x} \cup y = x$   
-- 111 [ para\_from,21.1.1,4.1.1.1,flip.1 ]  $\overline{x} \cup y \cup (x \cap y \cup z) = x \cup z$   
-- 129 [ para\_from,41.1.1,21.1.1.1 ]  $\overline{x \cap \mathbb{1} \cup x} \cap \emptyset = x$   
-- 147 [ para\_into,43.1.1.1.1,9.1.1 ]  $\overline{x \cap y} \cup \delta = (\overline{x} \cup \overline{y}) \cap \iota$   
-- 149 [ para\_from,43.1.1,21.1.1.1 ]  $x \cap \iota \cup x \cap \delta = x$   
-- 155 [ para\_into,24.2.1.1,47.1.1 ]  $c_2 \neq c_1 \vee \overline{c_1} \cap \overline{c_2} \cup c_2 \cap c_1 \neq \mathbb{1}$   
-- 158 [ para\_into,51.1.1,4.1.1 ]  $x \cup (y \cup \mathbb{1}) = \iota \cup (\delta \cup (x \cup y))$   
-- 159 [ copy,158,flip.1 ]  $\iota \cup (\delta \cup (x \cup y)) = x \cup (y \cup \mathbb{1})$   
-- 160 [ para\_from,51.1.1,21.1.1.1.1 ]  $\iota \cup (\delta \cup \overline{x}) \cup x \cap \mathbb{1} = x$

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-- 166 [ para_into,52.1.1.2,2.1.1 ]  $\iota U(x \cup \delta) = x \cup \mathbb{1}$ 
-- 167 [ para_into,52.1.1,2.1.1,demod,5 ]  $\delta U(x \cup \iota) = x \cup \mathbb{1}$ 
-- 168 [ copy,166,flip.1 ]  $x \cup \mathbb{1} = \iota U(x \cup \delta)$ 
-- 169 [ copy,167,flip.1 ]  $x \cup \mathbb{1} = \delta U(x \cup \iota)$ 
-- 170 [ para_into,129.1.1.1,47.1.1 ]  $\mathbb{1} \cap x \cup x \cap \emptyset = x$ 
-- 172 [ para_into,129.1.1.2,47.1.1 ]  $x \cap \mathbb{1} \cup \emptyset \cap x = x$ 
-- 174 [ para_into,129.1.1,2.1.1 ]  $x \cap \emptyset \cup x \cap \mathbb{1} = x$ 
-- 176 [ para_from,129.1.1,4.1.1.1,flip.1 ]  $x \cap \mathbb{1} \cup (x \cap \emptyset \cup y) = x \cup y$ 
-- 178 [ para_into,149.1.1.1,47.1.1 ]  $\iota \cap x \cup x \cap \delta = x$ 
-- 180 [ para_into,149.1.1.2,47.1.1 ]  $x \cap \iota \cup \delta \cap x = x$ 
-- 182 [ para_into,149.1.1,2.1.1 ]  $x \cap \delta \cup x \cap \iota = x$ 
-- 184 [ para_from,149.1.1,4.1.1.1,flip.1 ]  $x \cap \iota \cup (x \cap \delta \cup y) = x \cup y$ 
-- 186 [ para_into,27.1.1.2,149.1.1,flip.1 ]  $x \cap \iota \cup (y \cup x \cap \delta) = y \cup x$ 
-- 188 [ para_into,27.1.1.2,129.1.1,flip.1 ]  $x \cap \mathbb{1} \cup (y \cup x \cap \emptyset) = y \cup x$ 
-- 193 [ para_into,27.1.1.2,21.1.1,flip.1 ]  $\overline{x \cup y} \cup (z \cup x \cap y) = z \cup x$ 
-- 197 [ para_into,27.1.1,52.1.1 ]  $x \cup \mathbb{1} = \delta U(\iota \cup x)$ 
-- 198 [ para_into,27.1.1,2.1.1,demod,5 ]  $x \cup (y \cup z) = x \cup (z \cup y)$ 
-- 201 [ copy,197,flip.1 ]  $\delta U(\iota \cup x) = x \cup \mathbb{1}$ 
-- 202 [ para_from,27.1.1,21.1.1.1.1 ]  $x \cup (\overline{y \cup z}) \cup y \cap (x \cup z) = y$ 

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-- 214 [ para_from,169.1.1,21.1.1.1.1 ]  $\overline{\delta U(\bar{x}U\iota)}Ux\cap\mathbb{1}=x$ 
-- 221 [ para_into,28.1.1.2,166.1.1,demod,5 ]  $xU(yU\mathbb{1})=\iota U(yU(\delta Ux))$ 
-- 222 [ para_into,28.1.1.2,52.1.1,demod,5 ]  $xU(yU\mathbb{1})=\iota U(\delta U(yUx))$ 
-- 229 [ para_into,28.1.1.2,2.1.1 ]  $xU(yUz)=zU(yUx)$ 
-- 234 [ copy,221,flip.1 ]  $\iota U(xU(\delta Uy))=yU(xU\mathbb{1})$ 
-- 235 [ copy,222,flip.1 ]  $\iota U(\delta U(xUy))=yU(xU\mathbb{1})$ 
-- 241 [ para_into,170.1.1.2,47.1.1 ]  $\mathbb{1}\cap xU\emptyset\cap x=x$ 
-- 243 [ para_into,170.1.1,2.1.1 ]  $x\cap\emptyset U\mathbb{1}\cap x=x$ 
-- 245 [ para_from,170.1.1,4.1.1.1,flip.1 ]  $\mathbb{1}\cap xU(x\cap\emptyset Uy)=xUy$ 
-- 248,247 [ para_from,170.1.1,27.1.1.2,flip.1 ]  $\mathbb{1}\cap xU(yUx\cap\emptyset)=yUx$ 
-- 249 [ para_into,172.1.1,2.1.1 ]  $\emptyset\cap xUx\cap\mathbb{1}=x$ 
-- 259 [ para_into,178.1.1.2,47.1.1 ]  $\iota\cap xU\delta\cap x=x$ 
-- 288 [ para_into,180.1.1,2.1.1 ]  $\delta\cap xUx\cap\iota=x$ 
-- 337 [ para_into,241.1.1,2.1.1 ]  $\emptyset\cap xU\mathbb{1}\cap x=x$ 
-- 349 [ para_into,259.1.1,2.1.1 ]  $\delta\cap xU\iota\cap x=x$ 
-- 389 [ para_into,94.1.1.1.1,2.1.1 ]  $\overline{xU\emptyset U\mathbb{1}}\cap x=\mathbb{1}$ 
-- 391 [ para_into,94.1.1.2,47.1.1 ]  $\overline{\emptyset UxUx}\cap\mathbb{1}=\mathbb{1}$ 
-- 393 [ para_into,94.1.1,2.1.1 ]  $\mathbb{1}\cap xU\overline{\emptyset Ux}=\mathbb{1}$ 
-- 395 [ para_from,94.1.1,45.1.1.1,demod,19,19,flip.1 ]  $(\emptyset Ux)\cap(\emptyset U\bar{x})=\emptyset$ 

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-- 411 [ para\_into,96.1.1.1.1,31.1.1,demod,19 ]  $\emptyset \cup \iota \cap \iota = \iota$   
-- 421 [ para\_into,96.1.1.2,47.1.1 ]  $\overline{\delta \cup x \cup x} \cap \iota = \iota$   
-- 425 [ para\_from,96.1.1,45.1.1.1,demod,13,13,flip.1 ]  $(\delta \cup x) \cap (\delta \cup \bar{x}) = \delta$   
-- 436,435 [ para\_into,411.1.1,2.1.1 ]  $\iota \cap \iota \cup \emptyset = \iota$   
-- 442,441 [ para\_from,411.1.1,29.1.1.2,flip.1 ]  $\iota \cap \iota \cup (x \cup \emptyset) = x \cup \iota$   
-- 445 [ para\_from,435.1.1,4.1.1.1,flip.1 ]  $\iota \cap \iota \cup (\emptyset \cup x) = \iota \cup x$   
-- 479 [ para\_into,59.1.1.1,411.1.1,demod,13,13,13,flip.1 ]  $\mathbb{1} \cap (\delta \cup \delta) = \delta$   
-- 484,483 [ para\_into,479.1.1,47.1.1 ]  $(\delta \cup \delta) \cap \mathbb{1} = \delta$   
-- 497 [ para\_into,104.1.1.1,47.1.1 ]  $x \cap y \cup y \cap \bar{x} = y$   
-- 519 [ para\_into,104.1.1.2,47.1.1 ]  $x \cap y \cup \bar{y} \cap x = x$   
-- 521 [ para\_into,104.1.1,2.1.1 ]  $x \cap \bar{y} \cup x \cap y = x$   
-- 529 [ para\_into,389.1.1.2,479.1.1,demod,5 ]  $\overline{\delta \cup (\delta \cup \emptyset)} \cup \delta = \mathbb{1}$   
-- 531 [ para\_into,389.1.1.2,47.1.1 ]  $\overline{x \cup \emptyset} \cup x \cap \mathbb{1} = \mathbb{1}$   
-- 533 [ para\_into,389.1.1,2.1.1 ]  $\mathbb{1} \cap x \cup \overline{x \cup \emptyset} = \mathbb{1}$   
-- 568 [ para\_into,391.1.1,2.1.1 ]  $x \cap \mathbb{1} \cup \overline{\emptyset \cup x} = \mathbb{1}$   
-- 570 [ para\_from,391.1.1,45.1.1.1,demod,19,19,flip.1 ]  $(\emptyset \cup x) \cap (\bar{x} \cup \emptyset) = \emptyset$   
-- 582 [ para\_into,393.1.1.2.1,197.1.1 ]  $\mathbb{1} \cap \mathbb{1} \cup \delta \cup (\iota \cup \emptyset) = \mathbb{1}$   
-- 598 [ para\_from,393.1.1,39.1.1.1,demod,19,19,flip.1 ]  $(\emptyset \cup \bar{x}) \cap (\emptyset \cup x) = \emptyset$   
-- 604 [ para\_into,395.1.1.1,197.1.1,demod,19 ]  $(\delta \cup (\iota \cup \emptyset)) \cap (\emptyset \cup \emptyset) = \emptyset$

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-- 626 [ para_into,395.1.1.2.2,55.1.1 ]  $(\emptyset \cup (\emptyset \cup \emptyset)) \cap (\emptyset \cup \mathbb{1} \cap \mathbb{1}) = \emptyset$ 
-- 640 [ para_into,395.1.1.2.2,18.1.1 ]  $(\emptyset \cup \mathbb{1}) \cap (\emptyset \cup \emptyset) = \emptyset$ 
-- 678 [ para_into,640.1.1,47.1.1 ]  $(\emptyset \cup \emptyset) \cap (\emptyset \cup \mathbb{1}) = \emptyset$ 
-- 817 [ para_from,421.1.1,45.1.1.1,demod,13,13,flip.1 ]  $(\delta \cup x) \cap (\bar{x} \cup \delta) = \delta$ 
-- 873 [ para_into,425.1.1.2.2,68.1.1 ]  $(\delta \cup (\delta \cup \emptyset)) \cap (\delta \cup \mathbb{1} \cap \iota) = \delta$ 
-- 968 [ para_into,497.1.1.2,47.1.1 ]  $x \cap y \cup \bar{x} \cap y = y$ 
-- 970 [ para_into,497.1.1,2.1.1 ]  $x \cap \bar{y} \cup y \cap x = x$ 
-- 975 [ para_from,497.1.1,29.1.1.2,flip.1 ]  $x \cap \bar{y} \cup (z \cup y \cap x) = z \cup x$ 
-- 1027 [ para_into,519.1.1,2.1.1 ]  $\bar{x} \cap y \cup y \cap x = y$ 
-- 1089 [ para_into,529.1.1,2.1.1 ]  $\delta \cup \delta \cup (\delta \cup \emptyset) = \mathbb{1}$ 
-- 1099 [ para_into,531.1.1,2.1.1 ]  $x \cap \mathbb{1} \cup x \cup \emptyset = \mathbb{1}$ 
-- 1151 [ para_from,568.1.1,39.1.1.1,demod,19,19,flip.1 ]  $(\bar{x} \cup \emptyset) \cap (\emptyset \cup x) = \emptyset$ 
-- 1431 [ para_into,817.1.1.2,529.1.1 ]  $(\delta \cup (\delta \cup (\delta \cup \emptyset))) \cap \mathbb{1} = \delta$ 
-- 1495 [ para_into,88.1.1.1.1,197.1.1 ]  $\overline{\delta \cup (\iota \cup \mathbb{1} \cap \mathbb{1})} \cup (\emptyset \cup \emptyset) \cap \mathbb{1} = \emptyset \cup \emptyset$ 
-- 1511 [ para_into,88.1.1.2,570.1.1 ]  $\mathbb{1} \cap \mathbb{1} \cup (\overline{\emptyset \cup \emptyset}) \cup \emptyset = \emptyset \cup \emptyset$ 
-- 1575 [ para_into,968.1.1,2.1.1 ]  $\bar{x} \cap y \cup x \cap y = y$ 
-- 1677 [ para_into,1027.1.1.2,395.1.1,demod,36 ]  $\mathbb{1} \cap x \cap (\emptyset \cup x) \cup \emptyset = \emptyset \cup x$ 
-- 1766 [ para_from,1099.1.1,39.1.1.1,demod,19,19,flip.1 ]  $(\bar{x} \cup \emptyset) \cap (x \cup \emptyset) = \emptyset$ 
-- 2484 [ para_into,102.1.1.2,640.1.1,demod,5 ]  $\emptyset \cup (\overline{\emptyset \cup \emptyset \cup \mathbb{1}}) \cup \emptyset = \emptyset \cup \mathbb{1}$ 

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-- 2502 [ para\_into,102.1.1,2.1.1 ]  $x \cap y \cup y \cup \overline{x} = x$   
-- 2560 [ para\_into,106.1.1,2.1.1 ]  $x \cap y \cup \overline{y} \cup x = y$   
-- 2681,2680 [ para\_into,198.1.1.2,197.1.1,demod,34,flip.1 ]  $x \cup (\iota \cup (\delta \cup y)) = x \cup (\delta \cup (\iota \cup y))$   
-- 2684,2683 [ para\_into,198.1.1.2,168.1.1,demod,34,2681 ]  $x \cup (\iota \cup (y \cup \delta)) = x \cup (\delta \cup (\iota \cup y))$   
-- 2784 [ para\_from,229.1.1,598.1.1.2 ]  $(\emptyset \cup \overline{x} \cup y) \cap (y \cup (x \cup \emptyset)) = \emptyset$   
-- 2979,2978 [ para\_into,111.1.1.2,970.1.1,demod,10 ]  $x \cap y \cup x = x \cup y \cap x$   
-- 2981,2980 [ para\_into,111.1.1.2,968.1.1 ]  $\overline{x} \cup y \cup y = x \cup \overline{x} \cap y$   
-- 2988 [ para\_into,111.1.1.2,521.1.1,demod,10,2979 ]  $x \cup y \cap x = x \cup x \cap y$   
-- 2990,2989 [ para\_into,111.1.1.2,519.1.1 ]  $\overline{x} \cup y \cup x = x \cup \overline{y} \cap x$   
-- 2995,2994 [ para\_into,111.1.1.2,349.1.1,demod,2981 ]  $\delta \cup \overline{\delta} \cap x = \delta \cup \iota \cap x$   
-- 2997,2996 [ para\_into,111.1.1.2,337.1.1,demod,2981 ]  $\emptyset \cup \overline{\emptyset} \cap x = \emptyset \cup \mathbb{1} \cap x$   
-- 2998 [ para\_into,111.1.1.2,288.1.1,demod,2981,2995 ]  $\delta \cup \iota \cap x = \delta \cup x \cap \iota$   
-- 3001 [ para\_into,111.1.1.2,249.1.1,demod,2981,2997 ]  $\emptyset \cup \mathbb{1} \cap x = \emptyset \cup x \cap \mathbb{1}$   
-- 3003,3002 [ para\_into,111.1.1.2,241.1.1,demod,19,34 ]  $\overline{\emptyset \cup x} \cup x = \iota \cup (\delta \cup \emptyset \cap x)$   
-- 3014 [ para\_into,111.1.1.2,64.2.1,demod,10 ]  $c_2 \cap c_1 \cup \mathbb{1} = c_2 \cup c_2 \cap c_1 \vee c_2 = c_1$   
-- 3036 [ copy,2998,flip.1 ]  $\delta \cup x \cap \iota = \delta \cup \iota \cap x$   
-- 3037 [ copy,3001,flip.1 ]  $\emptyset \cup x \cap \mathbb{1} = \emptyset \cup \mathbb{1} \cap x$   
-- 3454 [ para\_from,604.1.1,104.1.1.1,demod,56 ]  $\emptyset \cup (\delta \cup (\iota \cup \emptyset)) \cap (\mathbb{1} \cap \mathbb{1}) = \delta \cup (\iota \cup \emptyset)$   
-- 3856 [ para\_into,155.2.1.2,47.1.1 ]  $c_2 \neq c_1 \vee c_1 \cap c_2 \cup c_1 \cap c_2 \neq \mathbb{1}$



-- 3873 [ para\_from,1431.1.1,1099.1.1.1,demod,5,5,5 ]  $\overline{\delta U \delta U (\delta U (\delta U (\emptyset U \emptyset)))} = \mathbb{1}$

-- 4101 [ para\_into,2502.1.1.1,1431.1.1,demod,34 ]  $\delta U \iota U (\delta U \delta U (\delta U (\delta U \emptyset))) = \delta U (\delta U (\delta U \emptyset))$

-- 4311,4310 [ para\_into,2978.1.1,197.1.1,demod,34,flip.1 ]  $\iota U (\delta U x \cap \mathbb{1}) = \delta U (\iota U \mathbb{1} \cap x)$

-- 4457,4456 [ para\_into,2988.1.1,2.1.1 ]  $x \cap y \cup y = y \cup y \cap x$

-- 4466,4465 [ para\_from,2988.1.1,201.1.1.2,flip.1 ]  $x \cap \iota U \mathbb{1} = \delta U (\iota U \iota \cap x)$

-- 4547,4546 [ para\_into,2998.1.1,2.1.1 ]  $\iota \cap x \cup \delta = \delta \cup x \cap \iota$

-- 4589,4588 [ para\_into,3001.1.1,2.1.1 ]  $\mathbb{1} \cap x \cup \emptyset = \emptyset \cup x \cap \mathbb{1}$

-- 4638,4637 [ para\_from,3001.1.1,59.1.1.1,demod,60,19,19 ]  $\mathbb{1} \cap (\bar{x} \cup \emptyset) = \mathbb{1} \cap (\emptyset \cup \bar{x})$

-- 4680 [ para\_into,160.1.1.1.1.2,1089.1.1 ]  $\overline{\iota U \mathbb{1} \cup (\delta U (\delta U \emptyset))} \cap \mathbb{1} = \delta U (\delta U \emptyset)$

-- 4694 [ para\_from,160.1.1,106.1.1.1.1 ]  $\bar{x} \cup x \cap \mathbb{1} \cap (\iota U (\delta U \bar{x})) = \iota U (\delta U \bar{x})$

-- 4730,4729 [ para\_into,3036.1.1,2.1.1 ]  $x \cap \iota U \delta = \delta \cup \iota \cap x$

-- 4784,4783 [ para\_into,3037.1.1,2.1.1 ]  $x \cap \mathbb{1} \cup \emptyset = \emptyset \cup \mathbb{1} \cap x$

-- 4852,4851 [ para\_into,176.1.1.2,497.1.1,demod,4784,flip.1 ]  $x \cup \emptyset \cap \bar{x} = \emptyset \cup \mathbb{1} \cap x$

-- 4858,4857 [ para\_into,176.1.1.2,241.1.1,demod,4784,34 ]  $\emptyset \cup \mathbb{1} \cap \mathbb{1} = \iota U (\delta \cup \emptyset \cap \emptyset)$

-- 4899 [ back\_demod,626,demod,4858 ]  $(\emptyset \cup (\emptyset \cup \emptyset)) \cap (\iota U (\delta \cup \emptyset \cap \emptyset)) = \emptyset$

-- 5004,5003 [ para\_into,184.1.1.2,1027.1.1,demod,4730,flip.1 ]  $\bar{x} \cup \delta \cap x = \delta \cup \iota \cap \bar{x}$

-- 5012,5011 [ para\_into,184.1.1.2,249.1.1,demod,4730,flip.1 ]  $\emptyset \cup \delta \cap \mathbb{1} = \delta \cup \iota \cap \emptyset$

-- 5140,5139 [ para\_into,186.1.1.2,3001.1.1,demod,5012,248,32,flip.1 ]  $\emptyset \cup \mathbb{1} = \mathbb{1}$

-- 5159 [ back\_demod,2484,demod,5140,19,5140 ]  $\overline{\emptyset \cup (\emptyset \cup \emptyset)} \cup \emptyset = \mathbb{1}$

-- 5168,5167 [ back\_demod,678,demod,5140 ]  $(\emptyset \cup \emptyset) \cap 1 = \emptyset$   
-- 5177 [ back\_demod,1495,demod,5168 ]  $\delta U(\iota U 1 \cap 1) \cup \emptyset = \emptyset \cup \emptyset$   
-- 5192,5191 [ para\_into,5139.1.1,197.1.1 ]  $\delta U(\iota U \emptyset) = 1$   
-- 5198,5197 [ para\_into,5139.1.1,51.1.1 ]  $\iota U(\delta U \emptyset) = 1$   
-- 5205 [ back\_demod,3454,demod,5192,5192 ]  $\emptyset \cup 1 \cap (1 \cap 1) = 1$   
-- 5210,5209 [ back\_demod,582,demod,5192,19,4784,4858 ]  $\iota U(\delta U \emptyset \cap \emptyset) = 1$   
-- 5211 [ back\_demod,4899,demod,5210 ]  $(\emptyset \cup (\emptyset \cup \emptyset)) \cap 1 = \emptyset$   
-- 5216,5215 [ back\_demod,4857,demod,5210 ]  $\emptyset \cup 1 \cap 1 = 1$   
-- 5218,5217 [ para\_from,5139.1.1,158.1.1.2,flip.1 ]  $\iota U(\delta U(x \cup \emptyset)) = x \cup 1$   
-- 5220,5219 [ para\_from,5139.1.1,445.1.1.2,demod,4466 ]  $\delta U(\iota U \iota \cap \iota) = \iota \cup 1$   
-- 5287 [ para\_into,188.1.1.2,1575.1.1,demod,4784,flip.1 ]  $\bar{x} \cap \emptyset \cup x = \emptyset \cup 1 \cap x$   
-- 5295 [ para\_into,188.1.1.2,337.1.1,demod,4784,5216,flip.1 ]  $\emptyset \cap \emptyset \cup 1 = 1$   
-- 5353 [ para\_from,5215.1.1,1151.1.1.2 ]  $(\overline{1 \cap 1} \cup \emptyset) \cap 1 = \emptyset$   
-- 5360,5359 [ para\_from,5215.1.1,445.1.1.2,demod,4466,5220,flip.1 ]  $\iota \cup 1 \cap 1 = \iota \cup 1$   
-- 5365,5364 [ para\_from,5215.1.1,29.1.1.2,flip.1 ]  $1 \cap 1 \cup (x \cup \emptyset) = x \cup 1$   
-- 5375,5374 [ back\_demod,5177,demod,5360 ]  $\delta U(\iota \cup 1) \cup \emptyset = \emptyset \cup \emptyset$   
-- 5377 [ back\_demod,1511,demod,5365,2990,19 ]  $\emptyset \cup \emptyset \cap \emptyset = \emptyset \cup \emptyset$   
-- 5441 [ para\_from,5295.1.1,98.1.1.1.1,demod,19 ]  $\emptyset \cup (\bar{\emptyset} \cup \bar{\emptyset}) \cap 1 = \bar{\emptyset} \cup \bar{\emptyset}$   
-- 5458,5457 [ para\_from,5205.1.1,445.1.1.2,demod,4466,5220,flip.1 ]  $\iota \cup 1 \cap (1 \cap 1) = \iota \cup 1$

-- 6100,6099 [ para\_into,193.1.1.2,243.1.1,demod,19,3003,flip.1 ]  $x \cap \emptyset \cup \mathbb{1} = \iota \cup (\delta \cup \emptyset \cap x)$   
-- 6108 [ para\_into,193.1.1.2,63.2.1,demod,10 ]  $\overline{c1} \cap c2 \cup \mathbb{1} = c2 \cap c1 \cup \overline{c1} \vee c2 = c1$   
-- 6257 [ para\_from,5377.1.1,59.1.1.1,demod,56,flip.1 ]  $\mathbb{1} \cap (\overline{\emptyset} \cup \overline{\emptyset}) = \mathbb{1} \cap \mathbb{1}$   
-- 6354,6353 [ para\_from,5159.1.1,441.1.1.2,demod,4466,5220,flip.1 ]  $\overline{\emptyset \cup (\emptyset \cup \emptyset)} \cup \iota = \iota \cup \mathbb{1}$   
-- 6363 [ para\_from,5353.1.1,160.1.1.2,demod,42,4311,5458,5375,flip.1 ]  $\overline{\mathbb{1} \cap \mathbb{1}} \cup \emptyset = \emptyset \cup \emptyset$   
-- 6392,6391 [ para\_from,6363.1.1,41.1.1.1,demod,56,flip.1 ]  $\mathbb{1} \cap \mathbb{1} \cap \mathbb{1} = \mathbb{1} \cap \mathbb{1}$   
-- 6393 [ para\_from,6363.1.1,159.1.1.2.2,demod,5218,5140,5140,flip.1 ]  $\overline{\mathbb{1} \cap \mathbb{1}} \cup \mathbb{1} = \mathbb{1}$   
-- 6404,6403 [ para\_from,6393.1.1,2560.1.1.2.1,demod,19,4589,6392,5216,flip.1 ]  $\mathbb{1} \cap \mathbb{1} = \mathbb{1}$   
-- 6405 [ back\_demod,6257,demod,6404 ]  $\mathbb{1} \cap (\overline{\emptyset} \cup \overline{\emptyset}) = \mathbb{1}$   
-- 6438,6437 [ para\_from,6403.1.1,45.1.1.1.2,demod,19,19 ]  $\overline{x \cup \mathbb{1}} = x \cap (\emptyset \cup \emptyset)$   
-- 6439 [ para\_from,6403.1.1,147.1.1.1.1,demod,34,19,19 ]  $\overline{\iota \cup (\delta \cup \delta)} = (\emptyset \cup \emptyset) \cap \iota$   
-- 6452,6451 [ para\_into,6405.1.1,47.1.1 ]  $(\overline{\emptyset} \cup \overline{\emptyset}) \cap \mathbb{1} = \mathbb{1}$   
-- 6453 [ back\_demod,5441,demod,6452,5140,flip.1 ]  $\overline{\emptyset} \cup \overline{\emptyset} = \mathbb{1}$   
-- 6456,6455 [ para\_from,6453.1.1,2560.1.1.2.1,demod,19,4457,4852 ]  $\emptyset \cup \mathbb{1} \cap \emptyset = \emptyset$   
-- 6469,6468 [ para\_from,6453.1.1,29.1.1.2,flip.1 ]  $\overline{\emptyset} \cup (x \cup \overline{\emptyset}) = x \cup \mathbb{1}$   
-- 6478,6477 [ para\_into,214.1.1.1.1.2.1,82.1.1,demod,2979,5220,484 ]  $\overline{\iota \cup \mathbb{1}} \cup \delta = \delta \cup \delta$   
-- 6481 [ para\_into,214.1.1.2,5211.1.1,demod,6354,5375,flip.1 ]  $\emptyset \cup (\emptyset \cup \emptyset) = \emptyset \cup \emptyset$   
-- 6489 [ para\_from,6455.1.1,445.1.1.2,demod,436,flip.1 ]  $\iota \cup \mathbb{1} \cap \emptyset = \iota$   
-- 6502,6501 [ para\_from,6455.1.1,59.1.1.1,demod,19,flip.1 ]  $\mathbb{1} \cap (\emptyset \cup \overline{\emptyset}) = \overline{\emptyset}$

-- 6533 [ para\_into,6489.1.1,2.1.1 ]  $1 \cap \emptyset = \emptyset$   
-- 6571 [ para\_from,6481.1.1,445.1.1.2,demod,442,flip.1 ]  $\emptyset \cup \emptyset = \emptyset$   
-- 6573 [ para\_into,6501.1.1,47.1.1 ]  $(\emptyset \cup \bar{\emptyset}) \cap 1 = \bar{\emptyset}$   
-- 6579 [ para\_from,6501.1.1,533.1.1.1,demod,5 ]  $\overline{\emptyset \cup \emptyset} = 1$   
-- 6585 [ para\_into,6571.1.1,29.1.1 ]  $\emptyset \cup (\emptyset \cup \emptyset) = \emptyset \cup \emptyset$   
-- 6587 [ para\_into,6573.1.1.1,2.1.1 ]  $(\bar{\emptyset} \cup \emptyset) \cap 1 = \bar{\emptyset}$   
-- 6623 [ para\_from,6585.1.1,94.1.1.1.1 ]  $\overline{\emptyset \cup 1} \cap (\emptyset \cup \emptyset) = 1$   
-- 6629 [ para\_from,6587.1.1,2978.1.1.1,demod,4638,6502,5,6469,5140 ]  $\bar{\emptyset} \cup (\bar{\emptyset} \cup \emptyset) = 1$   
-- 6633 [ para\_from,6629.1.1,2560.1.1.2.1,demod,19,4457 ]  $\emptyset \cup \emptyset \cap (\bar{\emptyset} \cup \emptyset) = \emptyset$   
-- 6635 [ para\_from,6629.1.1,109.1.1.2.1,demod,19,2979 ]  $\emptyset \cup (\bar{\emptyset} \cup \emptyset) \cap \emptyset = \emptyset$   
-- 6656,6655 [ para\_into,6477.1.1,2.1.1 ]  $\delta \cup \overline{\emptyset \cup 1} = \delta \cup \delta$   
-- 6666,6665 [ para\_from,6477.1.1,166.1.1.2,flip.1 ]  $\overline{\emptyset \cup 1} \cup 1 = \emptyset \cup (\delta \cup \delta)$   
-- 6675 [ para\_from,6477.1.1,43.1.1.1,demod,83,flip.1 ]  $(\emptyset \cup 1) \cap \emptyset = \emptyset$   
-- 6747 [ para\_from,6633.1.1,59.1.1.1,demod,42,flip.1 ]  $1 \cap (\bar{\emptyset} \cup \emptyset \cap 1) = \bar{\emptyset}$   
-- 6752,6751 [ para\_from,6635.1.1,193.1.1.2,demod,42,2979,6456,flip.1 ]  $\emptyset \cup (\bar{\emptyset} \cup \emptyset) = \bar{\emptyset} \cup \emptyset$   
-- 6758,6757 [ back\_demod,6579,demod,6752,42 ]  $\bar{\emptyset} \cup \emptyset \cap 1 = 1$   
-- 6762,6761 [ back\_demod,6747,demod,6758,6404,flip.1 ]  $\bar{\emptyset} = 1$   
-- 6764,6763 [ back\_demod,6629,demod,6762,6762,34,5198,34 ]  $\emptyset \cup (\delta \cup 1) = 1$   
-- 6774,6773 [ back\_demod,6468,demod,6762,6762,34 ]  $\emptyset \cup (\delta \cup (x \cup 1)) = x \cup 1$

-- 6782,6781 [ para\_from,6761.1.1,9.1.1.1.2,demod,6438 ]  $x \cap (\emptyset \cup \emptyset) = x \cap \emptyset$   
-- 6790,6789 [ para\_from,6761.1.1,1766.1.1.1.1,demod,34,5198,6782 ]  $\mathbb{1} \cap \emptyset = \emptyset$   
-- 6794,6793 [ para\_from,6761.1.1,41.1.1.1.1,demod,34,5198,19,flip.1 ]  $\emptyset \cap \mathbb{1} = \emptyset$   
-- 6796,6795 [ para\_from,6761.1.1,160.1.1.1.1.2.2,demod,6764,19,6794 ]  $\emptyset \cup \emptyset = \emptyset$   
-- 6803 [ para\_from,6761.1.1,21.1.1.1.1.1,demod,34 ]  $\overline{\iota \cup (\delta \cup x)} \cup \emptyset \cap x = \emptyset$   
-- 6808,6807 [ back\_demod,6437,demod,6796 ]  $\overline{x \cup \mathbb{1}} = x \cap \emptyset$   
-- 6809 [ back\_demod,6439,demod,6796 ]  $\iota \cup (\delta \cup \delta) = \emptyset \cap \iota$   
-- 6820,6819 [ back\_demod,6533,demod,6790 ]  $\emptyset \cup \iota = \iota$   
-- 6828,6827 [ back\_demod,6489,demod,6790 ]  $\iota \cup \emptyset = \iota$   
-- 6850,6849 [ back\_demod,3873,demod,6796 ]  $\delta \cup \delta \cup (\delta \cup (\delta \cup \emptyset)) = \mathbb{1}$   
-- 6855 [ back\_demod,4101,demod,6850,6656,flip.1 ]  $\delta \cup (\delta \cup (\delta \cup \emptyset)) = \delta \cup \delta$   
-- 6872,6871 [ back\_demod,6623,demod,6820,13,6828 ]  $\delta \cup \mathbb{1} \cap \iota = \mathbb{1}$   
-- 6938,6937 [ back\_demod,873,demod,6872 ]  $(\delta \cup (\delta \cup \emptyset)) \cap \mathbb{1} = \delta$   
-- 6948,6947 [ back\_demod,4680,demod,6938,6478,flip.1 ]  $\delta \cup (\delta \cup \emptyset) = \delta \cup \delta$   
-- 6998,6997 [ back\_demod,6855,demod,6948 ]  $\delta \cup (\delta \cup \delta) = \delta \cup \delta$   
-- 7000,6999 [ para\_into,234.1.1.2.2,197.1.1,demod,16,34,6774 ]  $\iota \cup (x \cup (\delta \cup \mathbb{1})) = x \cup \mathbb{1}$   
-- 7001 [ para\_into,234.1.1.2,234.1.1,demod,7000,5,flip.1 ]  $\delta \cup (x \cup (\iota \cup \mathbb{1})) = x \cup \mathbb{1}$   
-- 7018,7017 [ para\_into,235.1.1.2.2,6477.1.1,demod,6998,6666,2684,16 ]  $\iota \cup (\delta \cup \delta) = \delta \cup (\delta \cup \mathbb{1})$   
-- 7019 [ back\_demod,6809,demod,7018 ]  $\overline{\delta \cup (\delta \cup \mathbb{1})} = \emptyset \cap \iota$

-- 7028,7027 [ para\_into,6763.1.1.2,168.1.1,demod,7018,7000 ]  $\delta U \mathbb{1} = \mathbb{1}$   
-- 7030,7029 [ para\_into,6763.1.1.2,51.1.1,demod,7018,7028,7028 ]  $\iota U \mathbb{1} = \mathbb{1}$   
-- 7037 [ back\_demod,7019,demod,7028,7028,19,flip.1 ]  $\emptyset \cap \iota = \emptyset$   
-- 7042,7041 [ back\_demod,6999,demod,7028 ]  $\iota U(xU \mathbb{1}) = xU \mathbb{1}$   
-- 7048,7047 [ back\_demod,7001,demod,7030 ]  $\delta U(xU \mathbb{1}) = xU \mathbb{1}$   
-- 7052,7051 [ back\_demod,6675,demod,7030 ]  $\mathbb{1} \cap \iota = \iota \cap \mathbb{1}$   
-- 7103 [ para\_from,7037.1.1,182.1.1.2,demod,2979 ]  $\emptyset U \delta \cap \emptyset = \emptyset$   
-- 7133 [ para\_into,245.1.1.2,178.1.1,demod,7052,436,flip.1 ]  $\iota U \emptyset \cap \delta = \iota$   
-- 7195 [ para\_from,7103.1.1,59.1.1.1,demod,6762,6762,flip.1 ]  $\mathbb{1} \cap (\overline{\delta U \mathbb{1}}) = \mathbb{1}$   
-- 7211,7210 [ para\_from,7133.1.1,27.1.1.2,flip.1 ]  $\iota U(xU \emptyset \cap \delta) = xU \iota$   
-- 7241 [ para\_from,7195.1.1,106.1.1.2,demod,6808,6100,7211,32,19,5140,flip.1 ]  $\overline{\delta U \mathbb{1}} = \mathbb{1}$   
-- 7253 [ para\_from,7241.1.1,202.1.1.1.1.2,demod,5004 ]  $\delta U \iota \cap xU \mathbb{1} = \delta$   
-- 7663 [ para\_from,7253.1.1,193.1.1.2,demod,13,38,4547,32 ]  $\delta U(xU \mathbb{1}) \cap \iota = \mathbb{1}$   
-- 7689 [ para\_into,7663.1.1.2,47.1.1 ]  $\delta U \iota \cap (xU \mathbb{1}) = \mathbb{1}$   
-- 7729 [ para\_from,7689.1.1,193.1.1.2,demod,13,7048,32 ]  $\overline{xU \mathbb{1}} U \mathbb{1} = \mathbb{1}$   
-- 7775 [ para\_from,7729.1.1,6807.1.1.1,demod,19,flip.1 ]  $(xU \mathbb{1}) \cap \emptyset = \emptyset$   
-- 7820,7819 [ para\_from,7775.1.1,2560.1.1.1,demod,6762,34,7048,7042 ]  $\emptyset U \overline{xU \mathbb{1}} = \emptyset$   
-- 7822,7821 [ para\_from,7775.1.1,2502.1.1.1,demod,7820,6762,5140,flip.1 ]  $xU \mathbb{1} = \mathbb{1}$   
-- 7838,7837 [ back\_demod,6807,demod,7822,19,flip.1 ]  $x \cap \emptyset = \emptyset$

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-- 7841 [ back_demod,6108,demod,7822,flip.1 ]  $c2 \cap c1 \cup \overline{c1} = 1 \vee c2 = c1$ 
-- 7880 [ back_demod,3014,demod,7822,flip.1 ]  $\overline{c2} \cup c2 \cap c1 = 1 \vee c2 = c1$ 
-- 7936,7935 [ back_demod,52,demod,7822 ]  $\iota \cup (\delta \cup x) = 1$ 
-- 7944,7943 [ back_demod,5287,demod,7838,flip.1 ]  $\emptyset \cup 1 \cap x = \emptyset \cup x$ 
-- 7969,7968 [ back_demod,243,demod,7838,7944 ]  $\emptyset \cup x = x$ 
-- 7974,7973 [ back_demod,174,demod,7838,7969 ]  $x \cap 1 = x$ 
-- 7976,7975 [ back_demod,129,demod,7974,7838 ]  $x \cup \emptyset = x$ 
-- 7982,7981 [ back_demod,6803,demod,7936,19,7969 ]  $\emptyset \cap x = \emptyset$ 
-- 7984,7983 [ back_demod,4694,demod,7974,7936,7974,7936 ]  $\overline{x} \cup x = 1$ 
-- 8004,8003 [ back_demod,4851,demod,7982,7976,7969,flip.1 ]  $1 \cap x = x$ 
-- 8033 [ back_demod,2784,demod,7969,7976 ]  $\overline{x \cup y} \cap (y \cup x) = \emptyset$ 
-- 8044,8043 [ back_demod,1677,demod,8004,7969,7976,7969 ]  $x \cap x = x$ 
-- 8064,8063 [ para_from,7973.1.1,45.1.1.1.2,demod,19,7976 ]  $\overline{\overline{x} \cup y} = x \cap \overline{y}$ 
-- 8070,8069 [ para_from,7973.1.1,39.1.1.1.1,demod,19,7976 ]  $\overline{x \cup y} = \overline{x} \cap \overline{y}$ 
-- 8362 [ para_into,975.1.1.2,7880.1.1,demod,7822,flip.1 ]  $\overline{c2} \cup c1 = 1 \vee c2 = c1$ 
-- 8364 [ para_from,8362.1.1,8033.1.1.2,demod,8070,7974 ]  $\overline{c1} \cap c2 = \emptyset \vee c2 = c1$ 
-- 8367 [ para_from,8364.1.1,1027.1.1.1,demod,7969 ]  $c2 \cap c1 = c2 \vee c2 = c1$ 
-- 8370 [ para_from,8367.1.1,7841.1.1.1,factor_simp ]  $c2 \cup \overline{c1} = 1 \vee c2 = c1$ 
-- 8372 [ para_from,8370.1.1,8033.1.1.2,demod,8064,7974 ]  $c1 \cap \overline{c2} = \emptyset \vee c2 = c1$ 

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-- user CPU time 2.81 ( 0 hr,0 min,2 sec )  
-- system CPU time 0.0 ( 0 hr,0 min,0 sec )  
-- wall - clock time 3 ( 0 hr,0 min,3 sec )
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