

Product Chemical Content Brochure

BRD8022/D
Rev. 4, Oct-2003



ON Semiconductor®

<http://onsemi.com>

© SCILLC, 2003
Previous Edition © 2003
"All Rights Reserved"

Introduction

Dear Customer and Supplier:

The revised version of this brochure now contains the updated database of the composition of majority of our packages. It also contains the revised list of chemicals that are prohibited in our products and in manufacturing. This list is designed to meet ON Semiconductor's compliance with all applicable environmental, health and safety regulations of the countries where it operates and does business. It is also in concert with the needs of our customers for environmentally friendly products and in reduction in use of hazardous materials in the manufacture of these products. To help us meet these objectives, we are requiring our suppliers to restrict the use and content of the listed chemicals in the raw materials and products supplied to ON Semiconductor.

Through the release of this information, we hope to provide relevant data to help our customers in their evaluation of the potential environmental impact, in the proper end-of-life assessment and management of the products. It is our hope that this information will provide answers to the most frequently asked questions about the use or presence of the banned, restricted or hazardous materials in our products.

We have made all efforts to reasonably estimate amounts of all significant chemicals present in our products. The information is compiled by the package type as the amount and the type of materials in the devices under a particular family package remains significantly similar.

If you have any questions regarding this document or any of our products, please contact your ON Semiconductor Account Manager.

Bob Atkinson
Director, Global Environmental, Health and Safety

Note: Because of the diversity and complexity of ON Semiconductor's global manufacturing capabilities it is very difficult to provide accurate constituent data on our products. Among other factors, this is due to the wide range of products offered, the use of multiple fabrication and assembly locations for the same product, the qualification of multiple sources of raw materials, ranges in manufacturing specifications, as well as changes in product specifications over time.

Based on the above considerations, this information is provided for information purposes only as estimates of the average weight of these parts and the anticipated toxic metals components. No representation, warranty, or indemnity is offered or provided as to accuracy of data, completeness of components, or effects on person or property in disclosing this information.

ChipFET is a trademark of Vishay Siliconix. Micro8 is a trademark of International Rectifier.

POWERMITE is a registered trademark of and used under a license from Microsemi Corporation.

How to Use this Brochure

The brochure contains a summary matrix of chemical composition information on ON Semiconductor's package families associated with the standard component products. Products associated with a particular package family have similar structural process and chemical material composition. This matrix is aimed to help readers to find readily the concentrations of the materials, intentionally-added, and present in significant quantities. The matrix does not list the materials or their quantity, present as impurities, normally found in trace levels in the raw materials used in manufacture of these packages.

Explanation Of The Table

1. Total Component Weight

This is the actual average weight of the package. Most of these components are miniature in size and hence a small number of finished pieces are obtained at the end of the assembly line and are weighed to obtain an average weight. The average weight will not vary significantly for products associated with a particular package, assembled at various factories.

Weight and composition of many of the newer packages are obtained using engineering calculations. These calculations are based on the geometry of the leadframe, final package and material composition data provided by the suppliers of raw materials such as leadframe, mold compound, ink, die attach epoxy and plating materials used in these packages.

2. Mold Compound and its Weight

The weight of the mold compound provided is the actual weight of the mold compound used in the assembly process. In many instances, this data is obtained using engineering calculations based on leadframe and final package geometry and the material composition data obtained from the suppliers.

Composition of Mold Compounds

Mold compounds used by ON Semiconductor mainly contain a mixture of phenolic and epoxy resins and silica

as a filler compound. Epoxy resins normally contain a mixture of antimony trioxide, antimony pentoxide and TetraBromoBisphenol-A (TBBP-A) as a flame retardant system. TBBP-A is not present in a free state as it gets incorporated into epoxy polymer upon curing in the assembly process.

Flammability Of the Mold Compounds

All epoxy resins used by ON Semiconductor meet the flammability rating UL94 —VO at 1/8 inch class.

3. Metallic Composition

LeadFrames

ON Semiconductor uses leadframes usually composed of Alloy 42 or Copper alloys. The copper alloy mainly consists of copper and a small amount of other alloying elements like zinc, iron and phosphorus. Alloy 42 is composed of Iron and 42% nickel.

Plating

Usually, leadframes are plated with copper, nickel, and silver metals. Most of the devices have tin/lead (Pb) finish. ON Semiconductor also provides and has capability for supplying Pb-free plating packages.

Metals In Die Attach Epoxy

Gold and aluminum are mainly used in the wire bond process. The wafer substrate or the silicon chip is usually bonded to the leadframe using conductive silver or solder (tin/lead) based epoxy polymers.

The weight of the metal provided here reflects the total weight of that metal in one or more of the above forms in a package.

4. Silicon Chip

It consists of an active part of each device and is made of single crystal silicon. It contains deminimus amounts, usually in parts per billion (ppb) levels, of doped elements such as arsenic, phosphorus and boron.

Environmentally Restricted Substances

ON Semiconductor restricts the use and presence of certain substances, known to be toxic and harmful to the environment, in its manufacturing processes and products.

We are providing below a list of these materials, as we are very certain that many of our customers share these concerns:

List of Restricted Chemicals

CAS No.	Chemical Name
110-80-5	2-ethoxy ethanol (Ethylene Glycol Monoethyl Ether Acetate)
111-15-9	2-ethoxyethyl acetate (Ethylene Glycol Monethyl Ether)
109-86-4	2-methoxy ethanol (Ethylene Glycol Monomethyl Ether)
110-49-6	2-methoxyethyl acetate (Ethylene Glycol Methyl Ether Acetate)
50-00-0	Formaldehyde
71-43-2	Benzene
7440-43-9	Cadmium
12172-73-5	Amosite (Asbestos)
12001-29-5	Chrysotile (Asbestos)
12001-28-4	Crocidolite (Asbestos)
17068-78-9	Anthophyllite
14567-73-8	Temolite
13768-60-8	Actinolite
75-69-4	Trichlorofluoromethane (CFC-11)
75-71-8	Dichlorodifluoromethane (CFC-12)
354-58-5	1,1,1-Trichlorotrifluoroethane (CFC-113)
76-13-1	1,1,2-Trichlorotrifluoroethane (CFC-113)
76-14-2	Dichlorotetrafluoroethane (CFC-114)
76-15-3	Nonochloropentafluoroethane (CFC-115)
70075-72-9	Chlorotrifluoromethane (CFC-13)
354-56-3	Pentachlorofluoroethane (CFC-111)
76-12-0	Tetrachlorodifluoroethane (CFC-112)
422-78-6	Heptachlorofluoropropane (CFC-211)
3182-26-1	Hexachlorodifluoropropane (CFC-212)
2354-06-5	Pentachlorotrifluoropropane (CFC-213)
29255-31-0	Tetrachlorotetrafluoropropane (CFC-214)

CAS No.	Chemical Name
1599-41-3	Trichloropentafluoropropane (CFC-215)
661-97-2	Dichlorohexafluoropropane (CFC-216)
422-86-6	Chloroheptafluoropropane (CFC-217)
353-59-3	Bromochlorodifluoromethane (Halon 1211)
75-63-8	Bromotrifluoromethane (Halon 1301)
124-73-2	Dibromotetrafluoroethane (Halon 2402)
56-23-5	Carbon tetrachloride (CC-14)
71-55-6	1,1,1-Trichloroethane (TCA)
79-01-6	Trichloroethylene (TCE)
127-18-4	Tetrachloroethylene (Perchloroethylene)
60-29-7	Ethyl ether (allowed for lab use only)
302-01-2	Hydrazine
26628-22-8	Sodium azide
88-89-1	Picric Acid
7601-90-3	Perchloric Acid
	Polychlorinated naphthalenes
	Polybrominated diphenylethers and oxides (PBDE)
	Polychlorinated biphenyls (PCB)
67774-32-7	Polybrominated biphenyls (PBB)
74-83-9	Methyl Bromide
74-97-5	Chlorobromomethane
	Chlorinated paraffins
56-35-9	TBTO
21850-44-2	TBBP-A-Bis
2385-85-5	Mirex
	Cadmium compounds
7439-97-6	Mercury (except for use of articles)
	Mercury compounds

The ON Semiconductor EHS Department may add to this list if the use of a proposed chemical is expected to pose an unreasonable risk.

ON Semiconductor being a global manufacturer and supplier of semiconductors, complies with all relevant environmental, safety and health regulations and directives applicable to the country of manufacture and sale.

ON Semiconductor products are in full compliance with all applicable European directives including End-of Life Vehicle (ELV), Restrictions on use of certain Hazardous Substances (RoHS) and Waste from Electrical and Electronic Equipment (WEEE).

ON Semiconductor is actively pursuing its roadmap for reduction of lead (Pb) in its products. This roadmap is

designed to meet its customer requirements and will meet the scheduled regulatory requirement for reduction and phase out of lead (Pb) in its products. For further information, please visit our website:

<http://www.onsemi.com/site/content/0,,1148,00.html>

If you require additional information, please contact your ON Semiconductor Account Manager.

Restricted Substance Requirements for Suppliers

Suppliers to ON Semiconductor must ensure that all materials used in part manufacture and in facility operations satisfy all applicable environmental, health and safety government regulations and directives on restricted, toxic and hazardous materials. Suppliers must be prepared to provide supporting evidence of conformance.

Product supplied to ON Semiconductor, including recycled materials, must not be processed with or contain any of the restricted materials listed in this brochure.

Due to restrictions on heavy metals in many regions of the world, suppliers must ensure conformance; provide material verification and evaluation by an accredited laboratory when required by ON Semiconductor.

In some instances, ON Semiconductor may require laboratory test data annually as a part of material conformance verification.

If you require additional information, please contact your local Supply Management representative.

Significant Chemical Ingredients by Package (All weights are estimated average in mg, unless otherwise noted. N/A = Not Applicable. See Note 1)

Package Type	Total Component Weight	Molding Compound Weight	Total Resin Compounds Avg Weight	Total Bromine Compounds Avg Weight	Antimony Compounds	Copper	Gold	Iron	Lead	Nickel	Silver	Silica	Silicon	Tin	Zinc
CAS#s	-	-	N/A	N/A	N/A	7440-50-8	7440-57-5	7439-89-6	7439-92-1	7440-02-0	7440-22-4	N/A	7440-21-3	7440-31-5	7440-66-6
DPAK	351.00	120.50	33.1375	0.3601	3.6150	214.0000	0.0000	0.0000	3.6150	0.5215	0.0000	92.5400	0.2000	3.0100	0.0000
D2PAK	1,420.00	547.00	153.1600	1.4460	5.9404	849.7450	0.0000	0.0000	13.4800	2.2650	0.0000	368.7600	0.1870	25.0150	0.0000
HSOP 30	1,890.00	721.00	108.1500	14.4200	21.6300	1134.5000	3.9255	29.8000	0.0573	6.7400	0.0000	537.1400	19.5000	11.8400	2.2900
LQFP 64	332.00	233.00	27.9600	2.0970	0.6990	69.4600	1.4840	1.8300	2.4636	0.0000	3.5700	211.6700	10.5000	0.1197	0.1400
LQFP 100	725.30	453.60	40.8240	4.0824	0.6790	185.0000	2.1925	4.9400	2.8745	0.0000	5.1645	393.7560	73.9000	11.5100	0.3800
PBGA 208	1,850.00	750.00	138.7500	11.2500	22.5000	83.7850	4.4680	0.0004	371.1400	9.8202	13.9900	577.5000	28.8000	588.0000	0.0000
PDIP 8	482.16	319.00	79.7500	4.6255	9.5700	143.5000	0.1765	3.8300	2.7150	0.0000	1.0775	223.5800	2.1900	10.8450	0.2950
PDIP 14	973.42	327.00	81.7500	4.7415	9.8100	601.9500	0.3200	16.0500	5.2650	0.0000	1.0690	227.6700	2.5050	21.0500	1.2350
PDIP 16	1,001.00	642.00	160.5000	9.3090	19.2600	314.4000	0.3630	8.3900	6.0310	0.0000	1.6125	452.3800	3.9000	24.2000	0.6500
PDIP 20	1,346.60	457.00	114.2500	6.6265	13.7100	822.7500	0.4640	22.0000	7.5300	0.0000	1.6710	321.5700	4.2900	30.0500	1.6900
PDIP 24N	1,650.00	1,140.00	313.5000	34.2000	34.2000	450.4500	1.0930	12.0000	7.9400	0.0000	4.9505	754.3700	4.5200	31.8500	0.9250
PDIP 24W	3,680.00	3,000.00	750.0000	43.5000	90.0000	613.1500	1.0395	16.4000	8.6750	0.0000	0.6400	2116.9700	3.6100	34.7500	1.2600
PDIP 28	4,285.00	3,375.00	675.0000	48.9375	101.2500	826.0000	1.2035	22.0000	10.5712	0.0000	3.3650	2547.0700	5.6000	42.3000	1.7000
PLCC 20	670.00	473.00	118.2500	6.8585	14.1900	173.5000	0.7930	4.6300	2.8200	0.0000	1.6040	333.7200	1.9900	11.2900	0.3560
PLCC 28	1,080.00	783.00	156.6000	11.3535	23.4900	259.4000	1.1585	6.9250	3.9450	0.0000	3.2050	590.9955	6.5150	15.8800	0.5325
PLCC 44	2,237.00	1,672.00	334.4000	24.2440	50.1600	478.6500	1.8210	12.8000	6.2250	0.0000	7.8750	1263.5220	31.3700	24.9500	0.9830
PLCC 52	3,883.00	2,250.00	450.0000	32.6250	67.5000	1492.0000	2.1570	39.8200	7.4100	0.0000	11.3250	1693.6900	53.6000	29.8100	3.0600
PLCC 68	4,583.00	3,739.00	747.8000	54.2155	112.1700	754.6500	2.1745	20.1000	9.6350	0.0000	4.5050	2859.5400	16.1000	0.6148	1.5000
PLCC 84	6,743.00	5,444.00	1088.8000	78.9380	163.3200	1133.5000	3.5120	30.7000	11.9195	0.0000	9.4750	4121.8300	50.9000	47.7000	2.3600
PQFP 44	352.00	246.00	24.6000	2.2140	0.7380	0.0000	1.0815	39.7000	3.0400	30.0000	5.7760	221.3700	11.3300	12.1500	0.0000
PQFP 64	866.20	696.30	139.2600	10.0964	20.8890	0.0000	1.5130	45.9000	5.7450	34.4900	4.6700	549.5572	53.8500	0.2295	0.0000
PQFP 80	902.50	685.20	137.0400	9.9354	20.5560	0.0000	1.9325	77.5000	6.4650	58.1900	6.3900	544.0126	40.2200	0.2585	0.0000
PQFP 132	3,899.00	3,227.00	645.4000	46.7915	96.8100	545.6000	3.2972	14.6000	11.4893	0.0000	13.8050	2435.3670	38.6100	46.1167	1.1133
PSDIP 42	4,402.00	3,266.00	653.2000	47.3570	97.9800	1024.0000	1.7510	27.3000	13.1850	0.0000	6.2500	2463.0770	12.9000	52.9000	2.1000
QFP 160	5,093.20	4,394.50	439.4500	39.5505	13.1835	562.5000	4.8685	15.0000	15.8250	0.0000	3.3450	3963.0736	34.4000	0.8039	1.2000
SOIC 8	72.00	28.51	7.8403	0.7128	0.8553	38.0950	0.1885	1.0080	0.3765	0.0000	0.8330	19.1765	1.3250	1.5110	0.0782
SOIC 14	122.05	44.20	11.0500	0.6409	1.3260	71.2000	0.3085	1.9000	0.6555	0.0000	0.8135	30.4141	0.9765	2.6150	0.1500

1. Because of the diversity and complexity of ON Semiconductor's global manufacturing capabilities, it is very difficult to provide accurate constituent data on our products. Among other factors, this is due to the wide range of products offered, the use of multiple fabrication and assembly locations for the same product, the qualification of multiple sources of raw materials, ranges in manufacturing specifications, as well as changes in product specifications over time.

Based on the above considerations, this information is provided for information purposes only, as estimates of the average weight of these parts and the anticipated toxic metals components. No representation, warranty, or indemnity is offered or provided as to the accuracy of data, completeness of components, or effects on person or property in disclosing this information.

Significant Chemical Ingredients by Package (All weights are estimated average in mg, unless otherwise noted. N/A = Not Applicable. See Note 1)

Package Type	Total Component Weight	Molding Compound Weight	Total Resin Compounds Avg Weight	Total Bromine Compounds Avg Weight	Antimony Compounds	Copper	Gold	Iron	Lead	Nickel	Silver	Silica	Silicon	Tin	Zinc
SOIC 16	142.70	57.60	8.6400	1.7280	1.7280	77.7000	0.3515	2.1000	0.7485	0.0000	0.8080	43.0170	2.7340	2.9850	0.1600
SOIC 16W	422.00	134.00	33.5000	1.9430	4.0200	267.9500	0.3775	7.1500	0.7604	0.0000	2.9350	93.9137	5.8350	3.0650	0.5505
SOIC 20W	517.70	158.60	39.6500	2.2997	4.7580	331.6000	0.4715	8.8500	0.9503	0.0000	3.5235	111.7491	9.3300	3.8370	0.6810
SOIC 24W	663.00	243.50	60.8750	3.5308	7.3050	396.5000	0.5660	10.6000	1.1200	0.0000	1.7490	170.4500	3.7900	4.4800	0.8145
SOIC 28W	792.00	544.70	108.9400	7.8982	16.3410	196.7000	0.6870	5.2500	1.3065	0.0000	6.9550	412.6874	29.6100	5.2200	0.4050
SOT-23	8.14	4.90	1.2250	0.0711	0.1470	0.2521	0.0140	1.2460	0.0280	0.9031	0.5200	3.4618	0.1600	0.1120	0.0000
TO-92	198.00	106.00	26.5000	0.5380	1.2396	85.3081	0.1004	0.0228	0.5479	0.0000	0.4704	77.8638	3.2000	2.1915	0.0175
TO-220	1,962.00	543.10	81.4650	10.8620	16.2930	1383.2000	0.0000	0.0000	6.2250	0.2270	0.0000	435.2780	3.5500	24.9000	0.0000
TQFP 32 EP	73.00	43.00	4.3000	0.3870	0.1290	26.3800	0.6951	0.0000	0.0000	0.5450	0.7200	39.4190	0.3000	0.0665	0.0585
TSSOP 8	22.70	9.50	2.4000	0.1000	0.2000	10.3400	0.1000	0.0000	0.1600	0.3000	0.4000	6.8000	1.0000	0.9000	0.0000
TSSOP 20	70.00	45.80	4.5800	0.4122	0.0069	15.4550	0.4200	0.4120	0.5825	0.0000	1.5665	41.0832	3.1200	2.3300	0.0317
SMB	104.00	34.33	8.5825	0.3010	0.4200	65.1000	0.0000	0.0000	3.5000	1.4000	trace	21.8600	1.0400	4.9000	0.0000
SMA	69.00	57.68	9.2708	0.3345	1.7303	10.0549	0.0000	0.0000	5.3000	trace	0.0053	43.1600	0.9452	3.2000	0.0000
SMC	229.40	122.02	24.8124	2.1964	1.8303	99.1068	0.0000	2.4276	7.0000	0.0117	0.0816	91.5700	0.2294	6.4000	0.1315
Surmetic 40	607.00	234.09	49.1590	3.5114	2.9800	351.0550	0.0000	0.0000	7.5040	3.7680	0.0930	183.5396	4.4960	0.8940	0.0000
Surmetics 30	361.00	139.22	29.2360	2.0883	1.8934	208.7830	0.0000	0.0000	4.4630	2.2410	0.0910	106.0593	2.6730	3.4730	0.0000
SOD323	4.64	3.07	0.7675	0.0461	0.0921	0.0635	0.0060	0.7430	0.0257	0.0538	0.0000	2.1500	0.5881	0.1028	0.0000
SOD 123	11.67	8.40	0.2520	0.1260	0.2520	0.3681	0.2922	1.6008	0.1600	1.1600	0.0627	5.8800	0.8762	0.6400	0.0000
SOT 223	110.00	68.00	9.9200	0.4733	0.7953	38.0078	0.0140	0.9569	1.4880	0.0000	0.5203	48.5147	3.3000	5.9520	0.0577
SC88	6.20	3.90	0.8970	0.0312	0.0741	1.1440	0.0249	0.4920	0.0091	0.4034	0.0000	2.9020	0.1860	0.0363	0.0000
SC70	6.00	3.75	0.8600	0.0319	0.0750	0.1830	0.0100	1.1020	0.0300	0.7980	0.0000	2.7378	0.0973	0.0750	0.0000
SC 75	2.50	1.60	0.3650	0.0136	0.0320	0.0775	0.0100	0.4191	0.0275	0.3034	0.0000	1.1074	0.0570	0.0875	0.0000
SOT 323	6.00	3.75	0.8600	0.0319	0.0750	0.1830	0.0100	1.1020	0.0300	0.7980	0.0000	2.7378	0.0973	0.0750	0.0000
DO-35	263.65	0.00	Opaque Glass Sleeves = 39.91 mg	0.0000	0.0000	112.0700	0.0000	55.5000	2.8379	46.8700	0.0000	0.0000	1.6200	4.8360	0.0000
DO-41	307.73	0.00	Opaque Glass Sleeves = 62.90 mg	0.0000	0.0000	24.2000	0.0000	107.8000	5.6864	94.3778	0.0000	0.0000	3.0773	9.6900	0.0000

1. Because of the diversity and complexity of ON Semiconductor's global manufacturing capabilities, it is very difficult to provide accurate constituent data on our products. Among other factors, this is due to the wide range of products offered, the use of multiple fabrication and assembly locations for the same product, the qualification of multiple sources of raw materials, ranges in manufacturing specifications, as well as changes in product specifications over time.

Based on the above considerations, this information is provided for information purposes only, as estimates of the average weight of these parts and the anticipated toxic metals components. No representation, warranty, or indemnity is offered or provided as to the accuracy of data, completeness of components, or effects on person or property in disclosing this information.

Significant Chemical Ingredients by Package (All weights are estimated average in mg, unless otherwise noted. N/A = Not Applicable. See Note 1)

Package Type	Total Component Weight	Molding Compound Weight	Total Resin Compounds Avg Weight	Total Bromine Compounds Avg Weight	Antimony Compounds	Copper	Gold	Iron	Lead	Nickel	Silver	Silica	Silicon	Tin	Zinc
ChipFET	13.30	8.50	1.9550	0.0595	0.1190	4.5582	2.5700	0.1069	0.0060	0.0000	0.2980	3.2491	0.1330	0.2400	0.0053
POWERMITE	16.30	10.00	1.3800	0.1800	0.1380	5.0000	0.0029	0.1450	0.1100	0.0040	0.4200	8.1483	0.1430	0.6200	0.0088
TSOP6/SC74	13.43	10.00	2.6440	1.3920	0.1840	0.8590	0.0764	1.6200	0.0307	0.0000	0.0750	5.7800	0.6715	0.0965	0.0000
MOSORB / 3A Surmetic	1,334.62	550.00	110.0000	22.0000	16.5000	778.0000	0.0000	0.0000	6.1235	0.0000	0.1655	394.8269	6.6731	0.3310	0.0000
Micro8	24.90	12.10	2.4200	0.0968	0.2360	11.5288	0.2530	0.2892	0.0600	0.0000	0.3000	9.2133	0.2490	0.2400	0.0140
T0-218	4,000.00	2,140.00	428.0000	64.2000	27.6060	423.0000	Aluminum=655.80 mg	0.0000	118.8000	455.0000	0.0000	1620.2600	80.2000	122.4290	4.7000
SC59	11.02	7.12	1.4240	0.2136	0.1417	1.3500	0.0992	0.6970	0.1040	0.5050	0.4700	5.3500	0.2204	0.4160	0.0340
TOP CAN	1,780.00	140.00	28.0000	4.4500	4.2000	1590.0000	0.0000	0.0000	12.9500	0.2470	35.0000	104.0030	0.8900	0.2600	0.0000
TO225/ Case 77	601.00	273.60	51.9840	8.2080	10.3968	315.0000	3.0050	0.2000	2.3250	0.0000	0.0000	197.7012	6.0100	5.9700	0.2000
SC82	7.10	4.47	0.9000	0.1340	0.1206	1.2320	0.0105	0.1667	0.2370	0.0000	0.0000	3.3400	0.0071	0.9480	0.0000
1A Surmetics	250.82	113.00	26.0000	2.0340	3.3900	133.0000	0.0000	0.0450	0.7600	0.0000	0.0210	85.3720	0.1756	0.0224	0.0000
TSSOP 48	191.90	116.50	17.4000	0.4000	0.6000	61.0000	0.6000	0.0000	1.1900	1.9000	0.9800	98.8100	2.3000	6.7200	0.0000
QFN 3x3	23.00	12.60	2.1604	0.1260	0.2520	8.3243	0.0001	0.0171	0.1243	0.3586	0.3525	10.1493	0.6900	0.3600	0.0854
T0247	6,856.24	2,081.40	416.2800	Chlorinated compd = 31.22 mg	39.5466	4662.0964	24.6694	3.2684	4.7488	0.0000	20.3600	1553.8640	89.7650	8.0859	2.3346
Axial Lead Button	2,456.00	239.00	52.5800	3.5850	3.2265	2134.0000	0.0000	0.0000	15.3000	8.1816	0.4800	175.7069	42.1200	20.5800	0.2400
Surge Suppreser	2,141.00	342.00	47.8800	5.1300	6.4980	1614.0000	0.0000	0.0000	23.1000	11.9000	0.3000	275.5520	85.6400	70.4000	Indium=0.60 mg
TSOP 5	14.00	5.20	1.0400	0.0724	0.0728	7.9132	0.0764	0.1800	0.0774	0.0000	0.0756	4.1187	0.1400	0.2245	0.0090
US8	9.60	6.49	0.8700	0.1543	0.1440	2.8800	0.0010	0.1056	0.0001	0.0000	0.0044	5.3300	0.0200	0.0007	0.0900
TO-264	10,600.00	3,185.50	518.0622	Bis Cyclo Octane (CAS# 13560-89-9) = 135.70 mg	43.0043	7298.6118	0.0000	5.1218	20.9150	0.0040	0.7357	2696.5023	0.0040	13.3804	3.6585
T03	12,040.00	0.00	0.0000	0.0000	Indium (CAS# 7440-74-6) = 0.53 mg	0.0000	0.0000	11742.3600	18.5120	0.0000	0.2650	Carbon (CAS# 7440-44-0) =239.58 mg	18.3000	20.3170	0.0000

1. Because of the diversity and complexity of ON Semiconductor's global manufacturing capabilities, it is very difficult to provide accurate constituent data on our products. Among other factors, this is due to the wide range of products offered, the use of multiple fabrication and assembly locations for the same product, the qualification of multiple sources of raw materials, ranges in manufacturing specifications, as well as changes in product specifications over time.

Based on the above considerations, this information is provided for information purposes only, as estimates of the average weight of these parts and the anticipated toxic metals components. No representation, warranty, or indemnity is offered or provided as to the accuracy of data, completeness of components, or effects on person or property in disclosing this information.

Significant Chemical Ingredients by Package (All weights are estimated average in mg, unless otherwise noted. N/A = Not Applicable. See Note 1)

Package Type	Total Component Weight	Molding Compound Weight	Total Resin Compounds Avg Weight	Total Bromine Compounds Avg Weight	Antimony Compounds	Copper	Gold	Iron	Lead	Nickel	Silver	Silica	Silicon	Tin	Zinc
Power Tap	81,500.00	13,500.00	2700.0000	337.5000	270.0000	66314.5000	0.0000	0.0000	266.4000	380.0000	7.2000	10395.0000	815.0000	Indium (CAS# 7440-74-6) = 14.40 mg	0.0000
Microde Button	1,857.38	320.00	86.4000	0.0000	0.0000	1440.0000	0.0000	0.0720	50.0000	5.5000	3.3500	233.1082	3.7148	35.1000	Indium (CAS# 7440-74-6) = .135 mg
SOD523	1.70	1.08	0.1959	0.0162	0.0216	0.0538	0.0044	0.3038	0.0164	0.2200	0.0000	0.8446	0.0017	0.0151	0.0000
SOD123FL	11.64	5.79	1.4478	0.1158	0.1737	4.2500	0.0000	0.0000	0.5550	0.0000	0.0150	4.0568	0.9840	0.0418	0.0000
<p>1. Because of the diversity and complexity of ON Semiconductor's global manufacturing capabilities, it is very difficult to provide accurate constituent data on our products. Among other factors, this is due to the wide range of products offered, the use of multiple fabrication and assembly locations for the same product, the qualification of multiple sources of raw materials, ranges in manufacturing specifications, as well as changes in product specifications over time.</p> <p>Based on the above considerations, this information is provided for information purposes only, as estimates of the average weight of these parts and the anticipated toxic metals components. No representation, warranty, or indemnity is offered or provided as to the accuracy of data, completeness of components, or effects on person or property in disclosing this information.</p>															

Chemical Composition of Packages with External Lead (Pb) Free Plating* (All weights are estimated average in mg, unless otherwise noted. N/A = Not Applicable. See Note 1)

Package Type	Total Component Weight	Molding Compound Weight	Total Resin Compounds Avg Weight	Total Bromine Compounds Avg Weight	Antimony Compounds	Copper	Gold	Iron	Nickel	Silver	Silica	Silicon	Tin	Zinc
CAS#s	-	-	N/A	N/A	N/A	7440-50-8	7440-57-5	7439-89-6	7440-02-0	7440-22-4	N/A	7440-21-3	7440-31-5	7440-66-6
PDIP 8	482.1600	319.0000	79.7500	4.6255	9.5700	143.5000	0.1765	3.8300	0.0000	1.0775	223.5855	2.1900	13.5600	0.2950
PDIP 14	973.4200	327.0000	81.7500	4.7415	9.8100	601.9500	0.3200	16.0500	0.0000	1.0690	227.6745	2.5050	26.3150	1.2350
PDIP 16	1001.0000	642.0000	160.5000	9.3090	19.2600	314.4000	0.3630	8.3900	0.0000	1.6125	452.3845	3.9000	30.2310	0.6500
PDIP 20	1346.6000	457.0000	114.2500	6.6265	13.7100	822.7500	0.4640	22.0000	0.0000	1.6710	321.5685	4.2900	37.5800	1.6900
PDIP 24N	1650.0000	1140.0000	313.5000	34.2000	34.2000	450.4500	1.0930	12.0000	0.0000	4.9505	741.0000	17.8900	39.7900	0.9250
PDIP 24W	3680.0000	3000.0000	750.0000	43.5000	90.0000	613.1500	1.0395	16.4000	0.0000	0.6400	2116.9755	3.6100	43.4250	1.2600
PDIP 28	4285.0000	3375.0000	675.0000	48.9375	101.2500	826.0000	1.2035	22.0000	0.0000	3.3650	2557.6440	5.6000	42.3000	1.7000
PLCC 20	670.0000	473.0000	118.2500	6.8585	14.1900	173.5000	0.7930	4.6300	0.0000	1.6040	333.7185	1.9900	14.1100	0.3560
PLCC 28	1080.0000	783.0000	156.6000	11.3535	23.4900	259.4000	1.1585	6.9250	0.0000	3.2050	590.9955	6.5150	19.8250	0.5325
PLCC 44	2237.0000	1672.0000	334.4000	24.2440	50.1600	478.6500	1.8210	12.8000	0.0000	7.8750	1257.2970	31.3700	37.4100	0.9830
PLCC 52	3883.0000	2250.0000	450.0000	32.6250	67.5000	1492.0000	2.1570	39.8200	0.0000	11.3250	1693.6900	53.6000	37.2200	3.0600
PLCC 68	4583.0000	3739.0000	747.8000	54.2155	112.1700	754.6500	2.1745	20.1000	0.0000	4.5050	2859.5400	16.1000	10.2500	1.5000
PLCC 84	6743.0000	5444.0000	1088.8000	78.9380	163.3200	1133.5000	3.5120	30.7000	0.0000	9.4750	4121.8800	50.9000	59.6200	2.3600
PQFP 44	352.0000	246.0000	24.6000	2.2140	0.7380	0.0000	1.0815	39.7000	30.0000	5.7760	221.3700	11.3300	15.1900	0.0000
PQFP 64	866.2000	696.3000	139.2600	10.0964	20.8890	0.0000	1.5130	45.9000	34.4900	4.6700	549.5500	53.8500	5.9800	0.0000
PQFP 80	902.5000	685.2000	137.0400	9.9354	20.5560	0.0000	1.9325	77.5000	58.1900	6.3900	544.0100	40.2200	6.7300	0.0000
PQFP 132	3899.0000	3227.0000	645.4000	46.7915	96.8100	545.2000	3.1095	14.6000	0.0000	13.8050	2439.5100	35.2300	57.4200	1.1200
PSDIP 42	4402.0000	3266.0000	653.2000	47.3570	97.9800	1024.0000	1.7510	27.3000	0.0000	6.2500	2463.0800	12.9000	66.0900	2.1000
QFP 160	5093.2000	4394.5000	439.4500	39.5505	13.1835	562.5000	4.8685	15.0000	0.0000	3.3450	3963.0700	34.4000	16.6300	1.2000
SOIC 8	72.0000	28.5100	7.8403	0.7128	0.8553	38.0950	0.1885	1.0080	0.0000	0.8330	19.1765	1.3250	1.8875	0.0782
SOIC 14	122.0500	44.2000	11.0500	0.6409	1.3260	71.2000	0.3085	1.9000	0.0000	0.8135	30.4141	0.9765	3.2705	0.1500
SOIC 16	142.7000	57.6000	8.6400	1.7280	1.7280	77.7000	0.3515	2.1000	0.0000	0.8080	43.0170	2.7340	3.7335	0.1600
SOIC 16W	422.0000	134.0000	33.5000	1.9430	4.0200	267.9500	0.3775	7.1500	0.0000	2.9350	93.9137	5.8350	3.8254	0.5505
SOIC 20W	517.7000	158.6000	39.6500	2.2997	4.7580	331.6000	0.4715	8.8500	0.0000	3.5235	111.7440	9.3300	4.7873	0.6810
SOIC 24W	663.0000	243.5000	60.8750	3.5308	7.3050	396.5000	0.5660	10.6000	0.0000	1.7490	171.6698	3.7900	5.6000	0.8145
SOIC 28W	792.0000	544.7000	108.9400	7.8982	16.3410	196.7000	0.6870	5.2500	0.0000	6.9550	412.6874	29.6100	6.5265	0.4050

* Please consult your sales representative or accounts manager for exact availability.

1. Because of the diversity and complexity of ON Semiconductor's global manufacturing capabilities, it is very difficult to provide accurate constituent data on our products. Among other factors, this is due to the wide range of products offered, the use of multiple fabrication and assembly locations for the same product, the qualification of multiple sources of raw materials, ranges in manufacturing specifications, as well as changes in product specifications over time.

Based on the above considerations, this information is provided for information purposes only, as estimates of the average weight of these parts and the anticipated toxic metals components. No representation, warranty, or indemnity is offered or provided as to the accuracy of data, completeness of components, or effects on person or property in disclosing this information.

Chemical Composition of Packages with External Lead (Pb) Free Plating* (All weights are estimated average in mg, unless otherwise noted. N/A = Not Applicable. See Note 1)

Package Type	Total Component Weight	Molding Compound Weight	Total Resin Compounds Avg Weight	Total Bromine Compounds Avg Weight	Antimony Compounds	Copper	Gold	Iron	Nickel	Silver	Silica	Silicon	Tin	Zinc
SOT-23	8.1400	4.9000	1.2250	0.0711	0.1470	0.2521	0.0140	1.2460	0.9031	0.5200	3.4618	0.1600	0.1400	0.0000
TO-92	198.0000	106.0000	26.5000	0.5380	1.2396	85.3081	0.1004	0.0228	0.0000	0.4704	77.8640	3.2000	2.7394	0.0175
TQFP 32 EP	73.0000	43.0000	4.3000	0.3870	0.1290	26.3800	0.6951	0.0000	0.5450	0.7200	39.4200	0.3000	0.0665	0.0585
TSSOP 8	22.7000	9.5000	2.4000	0.1000	0.2000	10.3400	0.1000	0.0000	0.3000	0.4000	6.8000	1.0000	1.0600	0.0000
TSSOP 14	50.0000	35.2000	3.1680	0.2168	0.1056	11.9750	0.2945	0.3200	0.8920	1.0300	30.8798	1.0900	0.0037	0.0246
TSSOP 20	70.0000	45.8000	4.5800	0.4122	0.0069	15.4550	0.4200	0.4120	0.0000	1.5665	40.7620	3.1200	2.9125	0.0317
SOD323	4.6375	3.0700	0.7675	0.0461	0.0921	0.0635	0.0060	0.7430	0.0538	0.0000	2.1490	0.5881	0.1285	0.0000
SOD 123	11.6700	8.4000	0.2520	0.1260	0.2520	0.3681	0.2922	1.6008	1.1600	0.0627	5.8800	0.8762	0.8000	0.0000
SOT 223	110.0000	68.0000	9.9200	0.4733	0.7953	38.0078	0.0140	0.9569	0.0000	0.5203	48.5100	3.3000	7.4400	0.0577
SC88	6.2000	3.9000	0.8970	0.0312	0.0741	1.1440	0.0249	0.4920	0.4034	0.0000	2.9020	0.1860	0.0454	0.0000
SC70	6.0000	3.7500	0.8600	0.0319	0.0750	0.1830	0.0100	1.1020	0.7980	0.0000	2.7378	0.0973	0.1050	0.0000
SC 75	2.5000	1.6000	0.3650	0.0136	0.0320	0.0775	0.0100	0.4191	0.3034	0.0000	1.1074	0.0570	0.1150	0.0000
SOT 323	6.0000	3.7500	0.8600	0.0319	0.0750	0.1830	0.0100	1.1020	0.7980	0.0000	2.7610	0.0741	0.1050	0.0000
ChipFET	13.3000	8.5000	1.9550	0.0595	0.1190	4.5582	2.5700	0.1069	0.0000	0.2980	3.2491	0.1330	0.2460	0.0053
TSOP6/SC74	13.4300	10.0000	2.6440	1.3920	0.1840	0.8590	0.0764	1.6200	0.0000	0.0750	5.7800	0.6715	0.1300	0.0000
Micro8	24.9000	12.1000	2.4200	0.0968	0.2360	11.5288	0.2530	0.2892	0.0000	0.3000	9.2200	0.2490	0.3000	0.0140
SOEIAJ 14	222.0000	150.0000	28.5000	3.0000	3.2000	68.0000	0.2325	1.3078	0.4669	0.1931	114.8200	2.2200	Paladium = 0.02522	0.0281
SOEIAJ 16	227.6000	153.6000	29.1840	3.0720	3.0720	70.1840	0.3604	1.3380	0.4827	0.1931	117.3800	2.2760	Paladium = 0.0278	0.0300
SOEIAJ 20	286.1000	209.0000	39.7100	4.1800	4.5980	71.9960	0.3570	1.4000	0.5142	0.1931	160.2300	2.8610	Paladium = 0.0278	0.0300
SC59	11.0200	7.1200	1.4240	0.2136	0.1417	1.3500	0.0992	0.6970	0.5050	0.4700	5.3400	0.2204	0.5200	0.0340
SC82	7.1000	4.4661	0.9000	0.1340	0.1206	1.2320	0.0105	0.1667	0.0000	0.0000	3.3441	0.0071	1.1850	0.0000
TSSOP 16	55.5000	32.4000	3.4050	0.2916	0.1620	19.4341	0.5187	0.5187	0.5599	0.9821	28.9826	0.5550	Palladium = 0.0504	0.0399
TSSOP 48	191.9000	116.5000	17.4000	0.4000	0.6000	61.0000	0.6000	0.0000	1.9000	0.9800	98.8100	2.3000	7.9100	0.0000
QFN 3x3	23.0000	12.6000	2.1604	0.1260	0.2520	8.3243	0.0001	0.0171	0.3586	0.3525	10.0800	0.6900	0.5500	0.0854
TSOP 5	14.0000	5.2000	1.0400	0.0724	0.0728	7.9132	0.0764	0.1800	0.0000	0.0756	4.1200	0.1400	0.3000	0.0090
US8	9.6000	6.4896	0.8700	0.1543	0.1440	2.8800	0.0010	0.1056	0.0000	0.0044	5.3376	0.0200	0.0007	0.0900

* Please consult your sales representative or accounts manager for exact availability.

1. Because of the diversity and complexity of ON Semiconductor's global manufacturing capabilities, it is very difficult to provide accurate constituent data on our products. Among other factors, this is due to the wide range of products offered, the use of multiple fabrication and assembly locations for the same product, the qualification of multiple sources of raw materials, ranges in manufacturing specifications, as well as changes in product specifications over time.

Based on the above considerations, this information is provided for information purposes only, as estimates of the average weight of these parts and the anticipated toxic metals components. No representation, warranty, or indemnity is offered or provided as to the accuracy of data, completeness of components, or effects on person or property in disclosing this information.


Chemical Composition of Packages with External Lead (Pb) Free Plating* (All weights are estimated average in mg, unless otherwise noted. N/A = Not Applicable. See Note 1)

Package Type	Total Component Weight	Molding Compound Weight	Total Resin Compounds Avg Weight	Total Bromine Compounds Avg Weight	Antimony Compounds	Copper	Gold	Iron	Nickel	Silver	Silica	Silicon	Tin	Zinc
SOT 563	2.7000	1.4000	0.2660	0.0280	0.0280	0.0400	0.0440	0.6670	0.4830	0.0000	1.0780	0.0081	0.0550	0.0000
SOD523	1.7000	1.0800	0.1959	0.0162	0.0216	0.0538	0.0044	0.3038	0.2200	0.0000	0.8510	0.0017	0.0315	0.0000
SC89	2.9000	1.9100	0.3820	0.0287	0.0363	0.0870	0.0092	0.4500	0.3210	0.0028	1.4556	0.0290	0.0984	0.0000
SOT553	2.7000	1.4000	0.3080	0.0210	0.0280	0.0490	0.0490	0.6786	0.4956	0.0000	1.0430	0.0270	0.0009	0.0010

* Please consult your sales representative or accounts manager for exact availability.

1. Because of the diversity and complexity of ON Semiconductor's global manufacturing capabilities, it is very difficult to provide accurate constituent data on our products. Among other factors, this is due to the wide range of products offered, the use of multiple fabrication and assembly locations for the same product, the qualification of multiple sources of raw materials, ranges in manufacturing specifications, as well as changes in product specifications over time.

Based on the above considerations, this information is provided for information purposes only, as estimates of the average weight of these parts and the anticipated toxic metals components. No representation, warranty, or indemnity is offered or provided as to the accuracy of data, completeness of components, or effects on person or property in disclosing this information.

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your
local Sales Representative.