



FINAL PRODUCT/PROCESS CHANGE NOTIFICATION
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31-JUL-2002

SUBJECT: ON Semiconductor Final Product/Process Change Notification #12457

TITLE: Final Notification - Qualification of Tesla for Rectifier T0-220

EFFECTIVE DATE: 29-Sep-2002

AFFECTED CHANGE CATEGORY: ON Semiconductor Assembly and Test Site

AFFECTED PRODUCT DIVISION: Bipolar Discretes Products Div

ADDITIONAL RELIABILITY DATA: Available

Contact your local ON Semiconductor Sales Office or Mark Wasilewski <RYGF20@onsemi.com>

SAMPLES: Contact your local ON Semiconductor Sales Office
or Barbara Matteson <RM2230@onsemi.com>

FOR ANY QUESTIONS CONCERNING THIS NOTIFICATION:

Contact Sales Office or Mike Schager <RMF150@onsemi.com>

DISCLAIMER:

Final Product/Process Change Notification (FPCN) - Final Notification completing the notification process. Distributed at least 60 days from the effective date of the change. ON Semiconductor will consider this change approved unless specific conditions of acceptance are provided in writing within 30 days of receipt of this notice. To do so, contact your local ON Semiconductor Sales Office.

DESCRIPTION AND PURPOSE:

ON Semiconductor has qualified our Tesla Sezam facility as an additional assembly and test site for Rectifier T0-220AB and T0-220AC devices. This qualification affects Schottky and Ultrafast Rectifiers. Tesla Sezam, located in Rosnov, Czech Republic, has been making T0-220 products for 7 years. There will be no change to the form, fit, and function of the devices. Device parameters will continue to meet all Data Book specifications, and reliability will continue to meet or exceed ON Semiconductor standards.

RELIABILITY DATA SUMMARY:

MBR16100CT Schottky

Package: T0220AB

Reliability Test Results:

Test Description	Interval	Test Lot 1	Interval	Test Lot 2
HTRB	1000 hrs	0/77	500 hrs	0/77
H3TRB	1000 hrs		500 hrs	0/77
Temp Cycle	1000 cyc	0/77	500 cyc	0/77
Autoclave	96 hrs	0/77	96 hrs	0/77
IOL	8572 cyc	0/77	4286 cyc	0/77
DPA	2 pcs Pass			
Physical Dimension	10 pcs Pass			
Terminal Strength	30 pcs Pass			
Solderability	32 pcs Pass			

**Final Product/Process Change Notification #12457**

MUR8100E Ultrafast

Package: T0220AC

Reliability Test Results:

Test Description	Interval	Test Lot 3
HTRB	1000 hrs	0/77
Temp Cycle	1000 cyc	0/77
Autoclave	96 hrs	0/77
IOL	8572 cyc	0/77
Physical Dimension	10 pcs Pass	

Reliability Testing Conclusions:

Test results meet all quality and reliability requirements.

ELECTRICAL CHARACTERISTIC SUMMARY:

For Electrical Characterization Data Summary see below.

CHANGED PART IDENTIFICATION:

Product assembled at Tesla will be identified by NL site code marking..

QUALIFICATION PLAN

Qualification vehicle justification:

Technology	Qual Vehicle	Voltage	Justification
Schottky	MBR16100CT	100	Largest Rectifier die T0-220
Ultrafast	MUR8100E	1000	Highest Rectifier voltage T0-220

MBR16100CT Schottky

Package: T0220AB

Qualification Plan:

Test	Conditions
HTRB	V _r =80V, T _a =90 degC, 1000 hrs.
H3TRB	V _r =80V, T _a =85 degC, RH=85%, 1000 hrs.
Temp Cycle	Air to Air, -65 to +150 C, 15 min dwell, 1000 cycles
Autoclave	T _a =121 C, RH= 100%, PSI _g =15, 96 hrs.
IOL	T _j =125 C, 3.5 minutes on/off, 8572 cycles
DPA	After HTRB
Physical Dimension	Per T0-220AB; ON Semiconductor case #221A
Terminal Strength	MIL STD 750, 2036
Solderability	MIL STD 750, 2026.10, JESD22 B-102

MUR8100E Ultrafast

Package: T0220AC

Qualification Plan:

Test	Conditions
HTRB	V _r =800V, T _a =150degC, 1000 hrs.
Temp Cycle	Air to Air, -65 to +150 C, 15 min dwell, 1000 cycles
Autoclave	T _a =121 C, RH= 100%, PSI _g =15, 96 hrs.
IOL	T _j =125 C, 3.5 minutes on/off, 8572 cycles
Physical Dimension	Per T0-220AB; ON Semiconductor case #221B

**Final Product/Process Change Notification #12457****AFFECTED DEVICE LIST (WITHOUT SPECIALS):****PART**

BYV32-200	MUR620CT
BYW29-100	MUR805
BYW29-200	MUR810
BYW51-200	MUR8100E
BYW80-100	MUR815
BYW80-200	MUR820
MBR10100	MUR840
MBR1035	MUR860
MBR1045	MUR880E
MBR1060	MURH840CT
MBR1080	MURH860CT
MBR1090	MUR1660CT
MBR1535CT	MUR2020R
MBR1545CT	
MBR1545CTP	
MBR16100CT	
MBR1635	
MBR1645	
MBR20100CT	
MBR20100CTP	
MBR20200CT	
MBR20200CTP	
MBR2030CTL	
MBR2045CT	
MBR2045CTP	
MBR2060CT	
MBR2080CT	
MBR2090CT	
MBR2090CTLFAJ	
MBR2515L	
MBR2535CT	
MBR2535CTL	
MBR2545CT	
MBR2545CTP	
MBR3045ST	
MBR4015CTL	
MBR735	
MBR745	
MSR1560	
MSR860	
MUR1510	
MUR1515	
MUR1520	
MUR1540	
MUR1550	
MUR1560	
MUR1610CT	
MUR1610CTR	
MUR1615CT	
MUR1620CT	
MUR1620CTR	
MUR1640CT	
MUR1650CT	

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T0-220 Rectifier Qual at Tesla

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MUR8100E Electrical Characterization Data Summary DC @ Temps, Trr, ESD, and Ifsm.

Ir @ 1000V (Amps)	-55C			25C			100C			150C			175C		
	Test1	Test2	Test3	Test1	Test2	Test3	Test1	Test2	Test3	Test1	Test2	Test3	Test1	Test2	Test3
MIN	1.00E-10	1.00E-10	4.00E-10	6.33E-08	7.06E-08	7.95E-08	6.61E-06	6.39E-06	7.57E-06	7.59E-05	6.94E-05	7.91E-05	1.93E-04	1.71E-04	1.87E-04
MAX	5.12E-07	9.30E-09	2.74E-06	4.66E-06	4.83E-07	1.05E-06	1.68E-05	1.12E-05	1.31E-05	9.83E-05	1.25E-04	9.88E-05	2.63E-04	3.26E-04	2.49E-04
MEDIAN	4.70E-09	2.65E-09	3.10E-09	7.63E-08	8.21E-08	9.15E-08	7.25E-06	7.64E-06	8.59E-06	8.17E-05	8.14E-05	8.91E-05	2.15E-04	2.06E-04	2.16E-04
AVERAGE	3.94E-08	3.65E-09	1.20E-07	3.35E-07	9.79E-08	1.90E-07	7.83E-06	7.80E-06	8.84E-06	8.31E-05	8.30E-05	8.91E-05	2.16E-04	2.12E-04	2.15E-04
STDEV	1.02E-07	3.12E-09	5.28E-07	8.94E-07	7.36E-08	2.61E-07	1.98E-06	1.10E-06	1.14E-06	5.42E-06	1.25E-05	5.01E-06	1.49E-05	3.36E-05	1.51E-05
Limit	-	-	-	2.50E-05	2.50E-05	2.50E-05	5.00E-04	5.00E-04	5.00E-04	-	-	-	-	-	-
CPK	-	-	-	9.20E+00	1.13E+02	3.17E+01	8.29E+01	1.50E+02	1.44E+02	-	-	-	-	-	-

Vf @ 8A (Volts)	-55C			25C			100C			150C			175C		
	Test1	Test2	Test3	Test1	Test2	Test3	Test1	Test2	Test3	Test1	Test2	Test3	Test1	Test2	Test3
MIN	1.80E+00	1.63E+00	1.59E+00	1.57E+00	1.45E+00	1.42E+00	1.33E+00	1.26E+00	1.23E+00	1.19E+00	1.15E+00	1.12E+00	1.13E+00	1.10E+00	1.08E+00
MAX	2.03E+00	1.99E+00	2.01E+00	1.75E+00	1.73E+00	1.73E+00	1.46E+00	1.45E+00	1.42E+00	1.30E+00	1.31E+00	1.27E+00	1.24E+00	1.24E+00	1.20E+00
MEDIAN	1.92E+00	1.82E+00	1.68E+00	1.66E+00	1.60E+00	1.49E+00	1.39E+00	1.35E+00	1.29E+00	1.24E+00	1.21E+00	1.18E+00	1.18E+00	1.15E+00	1.13E+00
AVERAGE	1.92E+00	1.82E+00	1.74E+00	1.66E+00	1.59E+00	1.53E+00	1.39E+00	1.35E+00	1.31E+00	1.24E+00	1.21E+00	1.19E+00	1.18E+00	1.16E+00	1.14E+00
STDEV	6.53E-02	1.02E-01	1.27E-01	4.68E-02	7.77E-02	8.80E-02	3.33E-02	5.36E-02	5.28E-02	2.73E-02	4.32E-02	3.90E-02	2.53E-02	3.95E-02	3.41E-02
	-	-	-	1.80E+00	1.80E+00	1.80E+00	-	-	-	1.50E+00	1.50E+00	1.50E+00	-	-	-
CPK	-	-	-	9.63E-01	8.86E-01	1.00E+00	-	-	-	3.14E+00	2.21E+00	2.68E+00	-	-	-

(Control Cpk=6.80E-01)

Trr (Nanoseconds)	25C		
	Test1	Test2	Test3
MIN	6.04E+01	6.23E+01	6.37E+01
MAX	6.67E+01	6.84E+01	7.21E+01
MEDIAN	6.28E+01	6.44E+01	6.85E+01
AVERAGE	6.30E+01	6.45E+01	6.82E+01
STDEV	1.63E+00	1.53E+00	2.08E+00
Limit	1.00E+02	1.00E+02	1.00E+02
CPK	7.59E+00	7.71E+00	5.08E+00

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T0-220 Rectifier Qual at Tesla

**MUR8100E Electrical Characterization Data Summary
DC @ Temps, Trr, ESD, and Ifsm tested in Phx Lab**

Capacitance

(pF)
Vr=1V, 1mHz
MIN
MAX
MEDIAN
AVERAGE
STDEV

25C		
Test1	Test2	Test3
104.4	107.2	105.6
114.7	112.8	119.8
109.8	108.0	109.3
109.2	108.7	110.7
3.1	1.7	4.6

ESD

Machine Model Class
Human Body Model Class
Note: C is >400V, 3b is >8000V

25C		
Test1	Test2	Test3
-	C	-
-	3B	-

Ifsm @Tj=25 degC

(Amps)
Halfwave, single phase, 60Hz
MIN
MAX
MEDIAN
AVERAGE
STDEV
derated to Tj=175 degC
(Avg-3s) x 0.67

25C		
Test1	Test2	Test3
159.1	168.4	168.5
168.7	177.8	177.9
166.2	168.6	168.7
164.4	170.4	171.4
4.7	3.9	4.4
100.8	106.3	100.0

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T0-220 Rectifier Qual at Tesla

MBR16100CT Electrical Characterization Data Summary DC @ Temps, ESD, Ifsm, UIS, and Capacitance.

Vf @ If=8A (Volts)	-55 degC				25 degC				125 degC				175 degC			
	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3
Mean	0.740	0.734	0.736	0.718	0.724	0.712	0.712	0.706	0.588	0.577	0.585	0.577	0.514	0.507	0.514	0.504
Std Dev	0.004	0.0044	0.0070	0.0130	0.002	0.0022	0.0033	0.0039	0.0020	0.0018	0.0037	0.0045	0.0023	0.0022	0.0040	0.0043
Min	0.731	0.725	0.722	0.694	0.720	0.708	0.705	0.694	0.584	0.573	0.579	0.571	0.509	0.503	0.506	0.498
Max	0.750	0.745	0.747	0.742	0.729	0.717	0.717	0.714	0.592	0.581	0.593	0.585	0.518	0.512	0.522	0.512
Limit	-	-	-	-	0.740	0.740	0.740	0.740	0.600	0.600	0.600	0.600	-	-	-	-
Cpk	-	-	-	-	2.19	4.27	2.83	2.92	2.08	4.12	1.33	1.69	-	-	-	-

Vf @ If=16A (Volts)	-55 degC				25 degC				125 degC				175 degC			
	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3
Mean	0.901	0.880	0.884	0.862	0.820	0.801	0.802	0.802	0.682	0.670	0.676	0.665	0.615	0.604	0.611	0.599
Std Dev	0.007	0.0065	0.0098	0.0136	0.0027	0.0026	0.0029	0.0045	0.0027	0.0028	0.0036	0.0052	0.0030	0.0027	0.0038	0.0055
Min	0.886	0.866	0.861	0.824	0.813	0.794	0.795	0.794	0.678	0.662	0.670	0.659	0.610	0.597	0.604	0.593
Max	0.910	0.893	0.897	0.889	0.827	0.805	0.807	0.810	0.689	0.677	0.684	0.675	0.622	0.609	0.619	0.611
Limit	-	-	-	-	0.840	0.840	0.840	0.840	0.690	0.690	0.690	0.690	-	-	-	-
Cpk	-	-	-	-	2.43	5.05	4.43	2.86	0.950	2.44	1.30	1.59	-	-	-	-

Ir @ 100V (80V @ Tj=175)	-55 degC				25 degC				125 degC				175 degC			
	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3
	nA				uA				mA				mA			
Mean	0.461	0.086	0.415	0.233	0.683	0.593	0.719	1.040	1.27	1.45	1.08	1.59	16.14	16.21	13.92	20.33
Std Dev	0.436	0.071	0.984	0.289	0.045	0.055	0.100	0.322	0.09	0.10	0.19	0.44	1.02	1.46	2.16	4.74
Min	0.081	0.005	0.004	0.010	0.575	0.454	0.593	0.570	1.10	1.19	0.73	0.87	14.32	13.51	10.16	12.79
Max	1.991	0.310	4.401	1.328	0.795	0.678	0.998	1.411	1.45	1.62	1.37	2.35	18.39	19.16	17.58	28.42
Limit	-	-	-	-	100	100	100	100	5.00	5.00	5.00	5.00	-	-	-	-
Cpk	-	-	-	-	737.82	607.94	331.62	102.35	14.35	11.78	7.03	2.59	-	-	-	-

25 degC			
Control	Test 1	Test 2	Test 3

ESD

Machine Model Class
Human Body Model Class

C	C	-	-
3B	3B	-	-

Note: C is >400V, 3b is >8000V

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T0-220 Rectifier Qual at Tesla

MBR16100CT Electrical Characterization Data Summary

I_{FSM} @T_j=25 degC

(Amps)
Halfwave, single phase, 60Hz

	25 degC			
	Control	Test 1	Test 2	Test 3
Mean	253.8	292.5	300.0	293.0
Std Dev	10.5	4.6	0.0	4.8
Min	231.1	290.0	300.0	290.0
Max	262.3	300.0	300.0	300.0
Cpk	3.3	10.3	#DIV/0!	9.9
Spec	150.0	150.0	150.0	150.0

UIS @ 10mH (units as noted)

	ID Peak (A)				BVR (V)				Measured Energy (mJ)			
	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3
Mean	9.50	9.12	8.70	8.50	237.61	236.28	232.55	229.07	444.96	420.46	385.75	369.54
Std Dev	0.09	0.25	0.77	0.88	3.48	2.29	6.09	9.53	8.06	20.92	63.51	69.93
Min	9.31	8.49	7.27	6.39	233.33	232.76	223.71	204.70	425.28	367.81	266.45	210.31
Max	9.68	9.32	9.34	9.28	241.54	240.35	241.65	237.99	454.97	439.39	443.44	443.58

Capacitance (pF)

	C @ 0V				C @ 4V				C @ 30V				C @ 100V			
	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3	Control	Test 1	Test 2	Test 3
Mean	1405.4	1367.9	1387.2	1372.7	480.6	471.0	476.3	471.5	188.3	185.6	187.4	184.5	106.5	105.5	106.2	104.2
Std Dev	6.7	21.8	24.2	28.5	2.4	6.5	8.0	9.0	1.0	3.3	3.7	3.6	0.8	2.4	2.8	2.4
Min	1393.7	1332.5	1348.1	1337.9	476.9	463.3	464.3	460.3	186.9	180.3	182.0	179.7	105.7	101.8	103.1	101.3
Max	1422.7	1415.0	1438.6	1424.9	487.3	486.3	494.5	490.2	191.4	192.9	196.2	192.6	108.9	109.8	113.5	109.5