ON Semiconductor

FINAL PRODUCT/PROCESS CHANGE NOTIFICATION
Generic Copy

14-Jan-2010

SUBJECT: ON Semiconductor Final Product/Process Change Notification #16382

TITLE: 2N7002L Product types with Trench Die

PROPOSED FIRST SHIP DATE: 14-Apr-2010

AFFECTED CHANGE CATEGORY(S): Wafer Process going from a Planar to a Trench Design

AFFECTED PRODUCT DIVISION(S): PowerFET Business Unit

FOR ANY QUESTIONS CONCERNING THIS NOTIFICATION:
Contact your local ON Semiconductor Sales Office or Jennie Shen <Jennie.Shen@onsemi.com>

SAMPLES: Contact your local ON Semiconductor Sales Office or Brian Goodburn
< brian.goodburn@onsemi.com >

ADDITIONAL RELIABILITY DATA: Available
Contact your local ON Semiconductor Sales Office or Donna Scheuch <d.scheuch@onsemi.com>

NOTIFICATION TYPE:

Final Product/Process Change Notification (FPCN)

Final change notification sent to customers. FPCNs are issued at least 90 days prior to implementation 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 is sending out this notification to announce that a Die technology change is occurring for the 2N7002L product types. Currently, the 2N7002L is built with a Planar design. With this change, we will replace the existing Die with our Trench Die design.

The 2N7002L with the Trench Die will have comparable performance to the current 2N7002L in all aspects: electrical, switching, and dynamic characteristics.

The Trench Die will be primarily sourced from ON Semiconductors Wafer Fab in Aizu, Japan, but is also 2nd sourced from a Wafer Foundry in Korea. This particular Trench MOSFET platform has been qualified since 2007.

Final Product/Process Change Notification #16382

RELIABILITY DATA SUMMARY:

Aizu Trench 1 Platform Qualification
Reliability Test Results: 2N7002E
Test: High Temperature Reverse Bias (HTRB)
Conditions: Ta=150'C, Vds= 80% BVdss Rating, Duration : 1008-Hrs, 3-Lots
Results: 0/240

Test: High Temperature Gate Bias (HTGB)
Conditions: Ta=150'C, Vgs= 100% Vgs Rating, Duration : 1008-Hrs, 3-Lots
Results: 0/240

Test: Temperature Cycling (TC-PC)
Conditions: Ta=-65'C/150'C, Air-to-Air, Dwell >=10-min, 1000-cy, 1-Lot
Results: 0/80

Wafer Foundry Trench 1 Platform Qualification
Reliability Test Results: 2N7002E
Test: High Temperature Reverse Bias (HTRB)
Conditions: Ta=150'C, Vds= 80% BVdss Rating, Duration : 1008-Hrs, 3-Lots
Results: 0/231

Test: High Temperature Gate Bias (HTGB)
Conditions: Ta=150'C, Vgs= 100% Vgs Rating, Duration : 1008-Hrs, 3-Lots
Results: 0/231

Wafer Foundry Trench 1 Platform Qualification
Reliability Test Results: NTMS4107N
Test: High Temperature Reverse Bias (HTRB)
Conditions: Ta=150'C, Vds= 80% BVdss Rating, Duration : 1008-Hrs, 3-Lots
Results: 0/231

Test: High Temperature Gate Bias (HTGB)
Conditions: Ta=150'C, Vgs= 100% Vgs Rating, Duration : 1008-Hrs, 3-Lots
Results: 0/231

Test: Intermittent Operating Life (IOL-PC)
Conditions: Ta=25'C, delta Tj=100'C, 2-min on/off, 15K- cy, 3-Lots
Results: 0/231

Test: Temperature Cycling (TC-PC)
Conditions: Ta=-65'C/150'C, Air-to-Air, Dwell >=10-min, 1000-cy, 3-Lots
Results: 0/231

Test: Autoclave Test (AC-PC)
Conditions: Ta=121'C, P=15psi, RH=100%, Duration: 168-Hrs, 3-Lots
Results: 0/231

Test: High Humdity, High Temperature Reverse Bias (HTRB)
Conditions: Ta=85'C, Vds= 80% BVdss Rating, Rel Humidity=85%, Duration : 1008-Hrs, 3-Lots
Results: 0/231

Final Product/Process Change Notification #16382

ELECTRICAL CHARACTERISTIC SUMMARY:

2N7002 (Trench Version)

-55 ° C

	IGSS	IGSS	IDSS	IDSS	BVDSS	VTH	VTH	RDS(ON)	RDS(ON)	VSD
	Vgs= 20V	Vgs= -20V	Vds= 60V	Vds= 60V	250uA	250uA	250uA	Id= 50mA Vgs= 4.5V	Id= 240mA Vgs= 10V	Is=200mA
Min	8.50E-12	6.40E-12	0.00	0.00	61.8	1.795	1.795	0.449	0.347	0.885
Max	1.71E-10	2.21E-10	5.71E-10	9.98E-10	64.2	2.020	2.020	0.487	0.385	0.897
Mean	6.86E-11	7.21E-11	1.58E-10	4.09E-10	63.8	1.842	1.842	0.468	0.371	0.890
Std Dev	4.25E-11	4.727E-11	1.6791E-10	4.1E-10	0.51	0.043	0.043	0.010	0.011	0.003

25 ° C

	IGSS	IGSS	IDSS	IDSS	BVDSS	VTH	VTH	RDS(ON)	RDS(ON)	VSD
	Vgs= 20V	Vgs= -20V	Vds= 60V	Vds= 60V	250uA	250uA	250uA	Id= 50mA Vgs= 4.5V	Id= 240mA Vgs= 10V	Is=200mA
2N7002L Spec Limits	1.00E-07	1.00E-07	1.00E-06	1.00E-06	60	1	2.5	7.5	7.5	1.5
Cpk	**528**	**292**	**1260**	**1056**	**5.1**	**4.8**	**8.1**	**114**	**117**	**115**
Min	1.60E-12	3.00E-13	0.00	0.00	67.67	1.51	1.51	0.70	0.57	0.77
Max	2.13E-10	4.65E-10	1.16E-09	9.87E-10	70.27	1.71	1.71	0.78	0.63	0.78
Mean	7.47E-11	1.19E-10	2.40E-10	2.83E-10	69.78	1.56	1.56	0.75	0.61	0.78
Std Dev	6.31E-11	1.139E-10	2.6456E-10	3.15E-10	0.64	0.04	0.04	0.02	0.02	0.00

150 ° C

	IGSS	IGSS	IDSS	IDSS	BVDSS	VTH	VTH	RDON	RDON	VDSON
	Vgs= 20V	Vgs= -20V	Vds= 60V	Vds= 60V	250uA	250uA	250uA	Id= 50mA Vgs= 4.5V	Id= 240mA Vgs= 10V	Is=200mA
Min	1.90E-12	3.90E-12	8.59E-07	8.70E-07	74.950	0.950	0.950	1.316	1.090	0.582
Max	1.44E-10	2.43E-10	1.69E-06	1.70E-06	79.150	1.135	1.135	1.458	1.236	0.591
Mean	4.26E-11	1.01E-10	1.27E-06	1.27E-06	78.170	1.003	1.003	1.404	1.186	0.585
Std Dev	3.67E-11	7.26E-11	2.0773E-07	2.07E-07	1.197	0.035	0.035	0.0396	0.0402	0.0021

2N7002 (Trench Version)

Capacitance

	Ciss	Coss	Crss
	Vds= 25V	Vds= 25V	Vds= 25V
2N7002L Spec Limits	50	25	5
Cpk	**33**	**137**	**7.0**
Min	25.0	4.4	3.1
Max	28.3	4.5	3.4
Mean	27.5	4.4	3.2
Std Dev	0.23	0.05	0.09

Gate Charge

QT	QGS	QGD
Vdd= 10V	Id= 200mA	Vgs= 5V
No Spec		
0.90	0.30	0.10
0.90	0.30	0.20
0.90	0.30	0.17
0.00	0.00	0.05

Resistive Switching

	Td(on)	Tr	Td(off)	Tf
	Vgs= 10V	Id= 200mA	Vds= 30V	RG= 10 Ohms
2N7002L Spec Limits	30		40	
Cpk	**67**		**44**	
Min	3.0	5.6	11.6	2.8
Max	3.4	5.6	12.2	3.2
Mean	3.1	5.6	11.9	3.0
Std Dev	0.13	0.0	0.21	0.1

CHANGED PART IDENTIFICATION:

Products will have a Date Code of the Work Week 11, 2010 or newer.

Final Product/Process Change Notification #16382

AFFECTED DEVICE LIST

2N7002LT1G
2N7002LT1H
2N7002LT1
2N7002LT3G
2N7002LT3H
2N7002LT3