



ON Semiconductor®

ON Semi technology services through CMP

CMP Annual Users Meeting February 7th 2019

Gerhard Koops

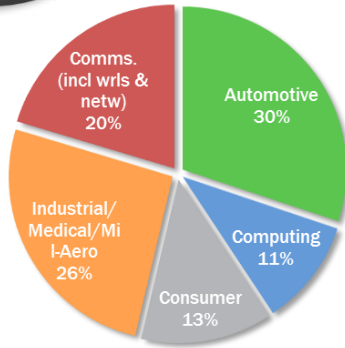
(gerhard.koops@onsemi.com)



ON introduction



Headquarters: Phoenix, AZ
Employees: 35,000 globally
Revenue: ~\$5.9Bn
Market Capitalization: ~\$8Bn
Ticker: ON



- Top 20 international semiconductor player
- >20 FAB sites in US, Europe and Asia
 - Wafer fabs
 - Assembly fabs
 - Test facilities
- Focus on smart power and high-reliable products with long lifetimes

Custom Foundry

- Team in Pocatello (US) → US customers
- Team in Oudenaarde (Be) → EU&APAC
- Custom Foundry addresses design houses and companies with own design teams
 - Wafer sales (low/high volumes)
 - FoundryPlus (package, ATE test,.....)

Technology overview

350 nm Technology

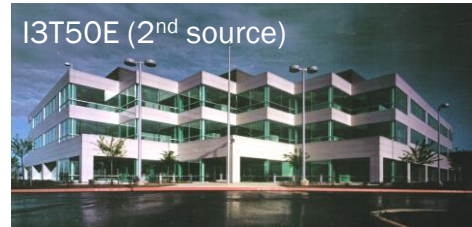
1. C035U
 - Base line 350nm including analog options
2. I3T25U, 3.3/25V
 - 25V BCD technology
3. I3T50E
 - BCD/HV technology (36V operational)
 - Trench isolation

180 nm Technology

1. ONC18 G M/S
 - Base line 180 nm digital, mixed-signal
2. ONC18 18V/18V
 - 1.8V, 18 V core with 5V input
 - 18V gate, 18V drain option
3. I4T45/70
 - BCD/HV technology (45V/70V)
 - Trench isolation

- Both technologies are high runners in industrial ... automotive products → longevity, support
- Stitching can be done for both technologies
- Small process changes (e.g. passivation tunes supporting post-processing) can be considered
- Libraries included (core, IO, libraries....)

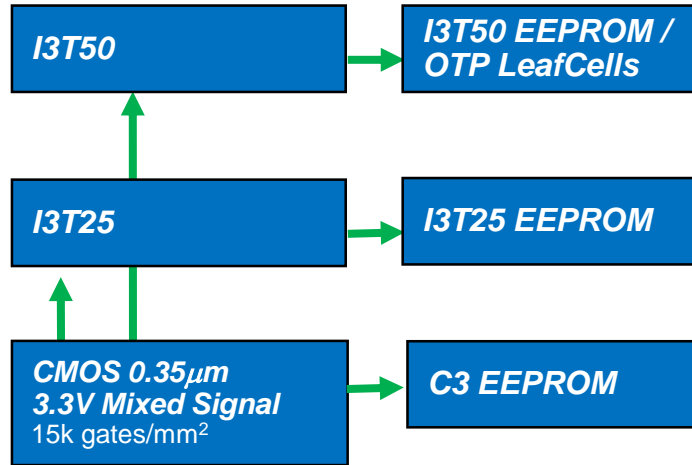
350 nm Platform



50V VnDMOS
50V LpDMOS
50V Floating Nepi
Deep Trench Isolation

25V LnDMOS
25V LpDMOS
25V Floating Nepi

3LM
3.3V Vg
MIMC capa (1.5fF/μm²)
High res poly (1kΩ/μ)
Floating Nepi



3LM-5LM

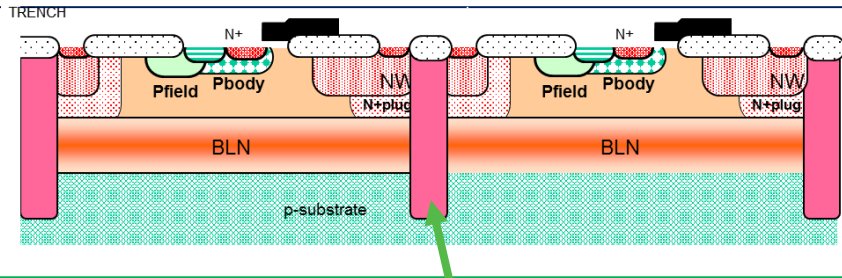
Power
Metal – 3μm

High Temp
T_{amb}=175°C
T_{junc}=200°C

4kV ESD

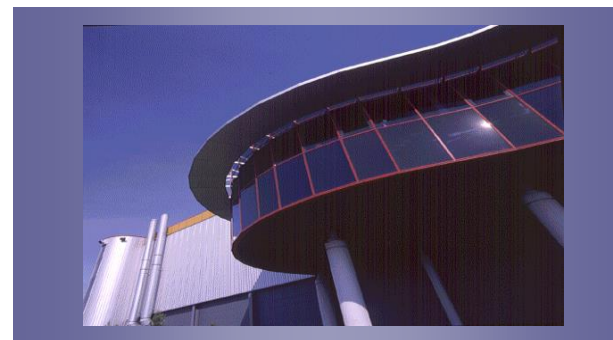


0.35 μm I3T50



- **Deep trench isolation for compact HV devices**
- Characterized till 200 °C
- Qualified up to 190 °C
- 4kV HBM, 750V CDM and 250V MM capabilities
- Automotive qualified
- Lifetime of technology will be very long (ongoing automotive design-ins)

- ✓ Deep Trench Isolation
- ✓ Extensive ESD library
- ✓ EEPROM and OTP
- ✓ 3-5 Metal layers
- ✓ 50V DMOS
- ✓ 3.3V IO
- ✓ HR poly
- ✓ MIM capacitors



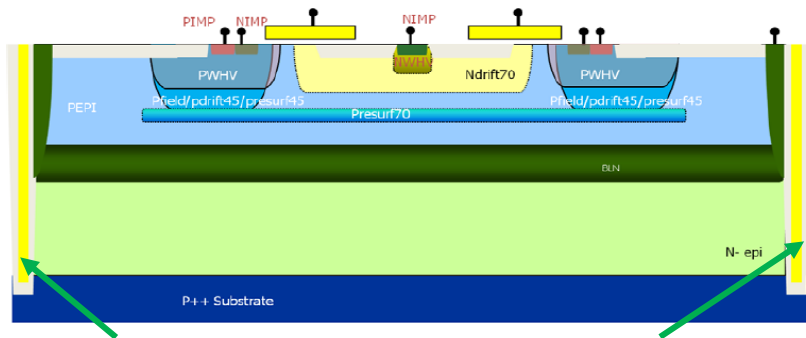
Wafer fab Oudenaarde (Belgium)

ONC18 Platform Integration

- Extended temperature range:
- Qualified from -45°C – 200°C
- Cryo models
- Trench isolation for I4T70 (>100V)
- Stitching
- Planarized passivation

Vg = Vd =	1.8V 1.8V	3.3V 3.3V	5V 5V	3.3V 15V	3.3V 30,45,70V	5V 18,24,30V	18V 18V	MiM, Res, Diode	DN-Well LoTemp-Res Native Tr.
ONC18 D	X	X						X	
ONC18 MS	X	X		X				X	X
i4T45 / 70	X	X			X			X	X
ONC18 5V/30V	X		X			X		X	X
ONC18TG 18/18V	X		X			X	X	X	X

0.18 μm I4T-70V



- Deep trench isolation for compact HV devices
- 30V, 45V and 70V DMOS
- Characterized till 200°C and cryo-models available
- Very well suited for automotive and other high reliable applications
- Automotive qualified

- ✓ DTI isolation > 100V
- ✓ EEPROM and OTP
- ✓ ESD cells
- ✓ 4-6 Metal layers
- ✓ 30, 45 and 70V DMOS
- ✓ 1.8 and 3.3V Core-cell libraries
- ✓ 5V tolerant I/Os
- ✓ HR poly and MIM capacitors
- ✓ High Vt (low leakage) options




Wafer fab Gresham (US), 8 inch, Full SMIF, production down to 0.11 μm .

ON – CMP offering

MPW SCHEDULE	A	M	J	J	A	S	O	N	D	Standard price in €/mm ²	Discounted price in €/mm ² *
0.35µm ONC35U 4M including analog options			1			16			2	720	670
0.35µm ONC35I3T25U 3.3/25 V 4M only thick top metal			1			16			2	770	720
0.35µm ONC35I3T50U (E) 50 V 4M (5M on special request)						2			2	925	875
0.18µm ONC18MS (0.18 µm - 1.8/3.3 V - 15V DMOS - 5LM - MIMC - ESD - HIR - EPI)			10		12		7		9	1100	1050
0.18µm ONC18I4T 45/70V HV CMOS (=ONC18MS + 30V + 45V + 70V DMOS)			10		12		7		9	1540	1480

MPW schedule available Q2 2019

- Ideal for prototyping
- Shuttle schedule available
- Pricing available
- Wide range of QTA options

 ON Semiconductor®	Max Operating Voltage (V _{gs})	Max Drain Voltage (V _{ds})	T _{min} /T _{max}	# Metal Layers	Isolation	MEMORIES
						RAM / ROM / OTP /EEPROM
0.35µm ONC35U	3.3V / 5V	5V	-40/+150	3-5	Junction	Y ¹
0.35µm ONC35I3T25U	3.3V / 12V	25V	-40/+155	3-5	Junction	Y ¹
0.35µm ONC35I3T50U	3.3V	50V	-40/+190	3-5	DTI	Y ¹
0.18µm ONC18MS	1.8V / 3.3V	15V	-45/+135 ²	4-6	Junction	Y
0.18µm ONC18I4T	1.8V 3.3V	70V	-45/+200 ²	4-6	DTI	Y

Technology offering available Q2 2019

- MLM (Multi-layer mask set)
- SLM (Production mask set)
- QTA
- Engineering / Production



Thank You

- **Contact:**

- Ronald De Clerck (ronald.declerck@onsemi.com)
- Stefan Vanhaeverbeke (Stefan.vanhaevebeke@onsemi.com)
- Gerhard Koops (gerhard.koops@Onsemi.com)