

 Pakal Tech

Customer Introduction



IGTO(t) Technology

1. Introducing IGTO(t)
2. IGTO(t) Fabrication, Structure & Advantages
3. Gen 2 Measured Results Comparisons
4. IGTO(t) Gen 3 & 1200 V Development In Progress

World Class Leadership

Team created and will leverage superior IGTO(t) platform

Dr Richard Blanchard and Dr Vladimir Rodov lead the team. Collectively, they and team have invented & commercialized:

- **Trench MOSFETS, \$7B** annual global coverage
- SBR Diode, >\$300 M annual, marketed by Diodes Inc.
- FERD Diode, >\$350 M annual, marketed by STMicro



New Patented, Proven Silicon, **Pakal's IGTO(t)**

Our expert technical team has created the IGTO(t), a novel high-voltage (>600 V) silicon power semiconductor.

The IGTO(t) is a direct drop-in replacement for today's IGBT. This is a rare and significant achievement.

The last new power semiconductor was the IGBT itself - 45 years ago.



Novel Structure, Global Patents, Scalable Solution

	Issued	Pending
USA	24	9
Europe	2	3
Japan	2	
Taiwan	3	
China	2	
Korea	2	

More every Quarter

Dr Richard Blanchard manages Pakal's IP strategy and protection of new inventions.
He also holds more than 300 US Patents.

IGTO(t) Fabrication & Design

A Globally Scalable Direct Drop-in

Low-Cost Manufacture

- ✓ Inexpensive 8” Power MOS/Trench process
- ✓ Very similar to Trench MOSFET or IGBT

Legacy Silicon Equipment

- ✓ Fully amortized topside equipment >130 nm geometry
- ✓ Silicon manufacturing capacity produces 90% of global high-power market today – and for the future.
- ✓ Standard processes applied – for differentiated structure
- ✓ Differentiated tailored recipes

IGTO(t) Platform Technology Summary

Significant Advantages

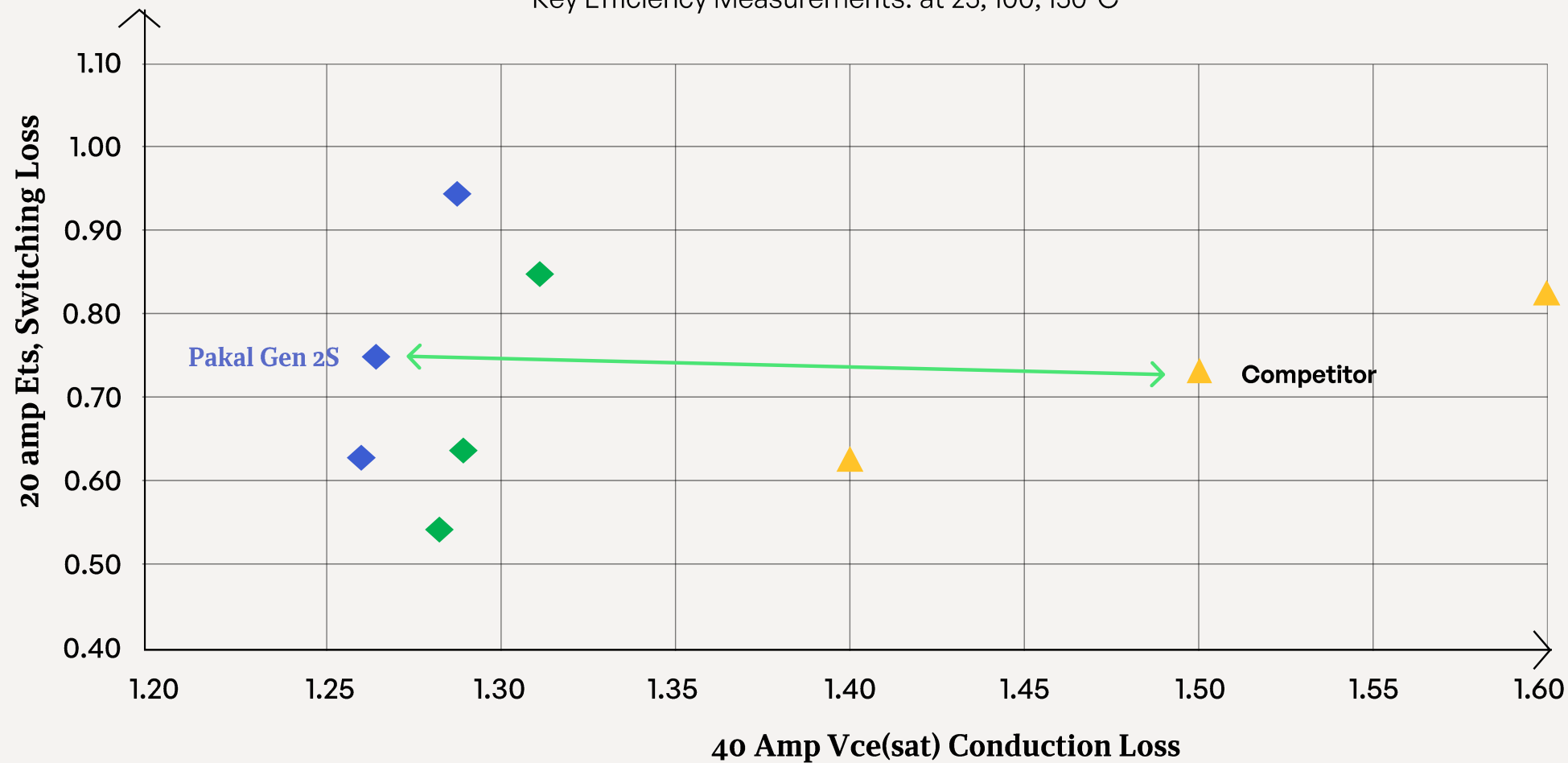
- ✓ Superior, operational physics.
- ✓ Two Carrier Current Flow: always inherently lower conduction losses.
- ✓ Elegant rapid voltage gate drive switching.
- ✓ Cost-effective, scalable standard manufacturing process.
- ✓ Pin-to-pin package compatible & die drop-in, no change required to controllers/drivers.



Measured results: 650 Volt 40 Amp Device Comparison

Pakal Gen 2.2S vs. Leading Low VCE(sat) Competitor

Key Efficiency Measurements: at 25, 100, 150°C



Pakal Gen 2S
vs.
Leading Low VCE(sat)
Competitor

At 100 C identical
Ets and 15% lower
conduction losses

IGTO(t) Fabrication & Design

Product Release Schedule

✓ Gen 2.2 650 V 40 Amp Sampling now

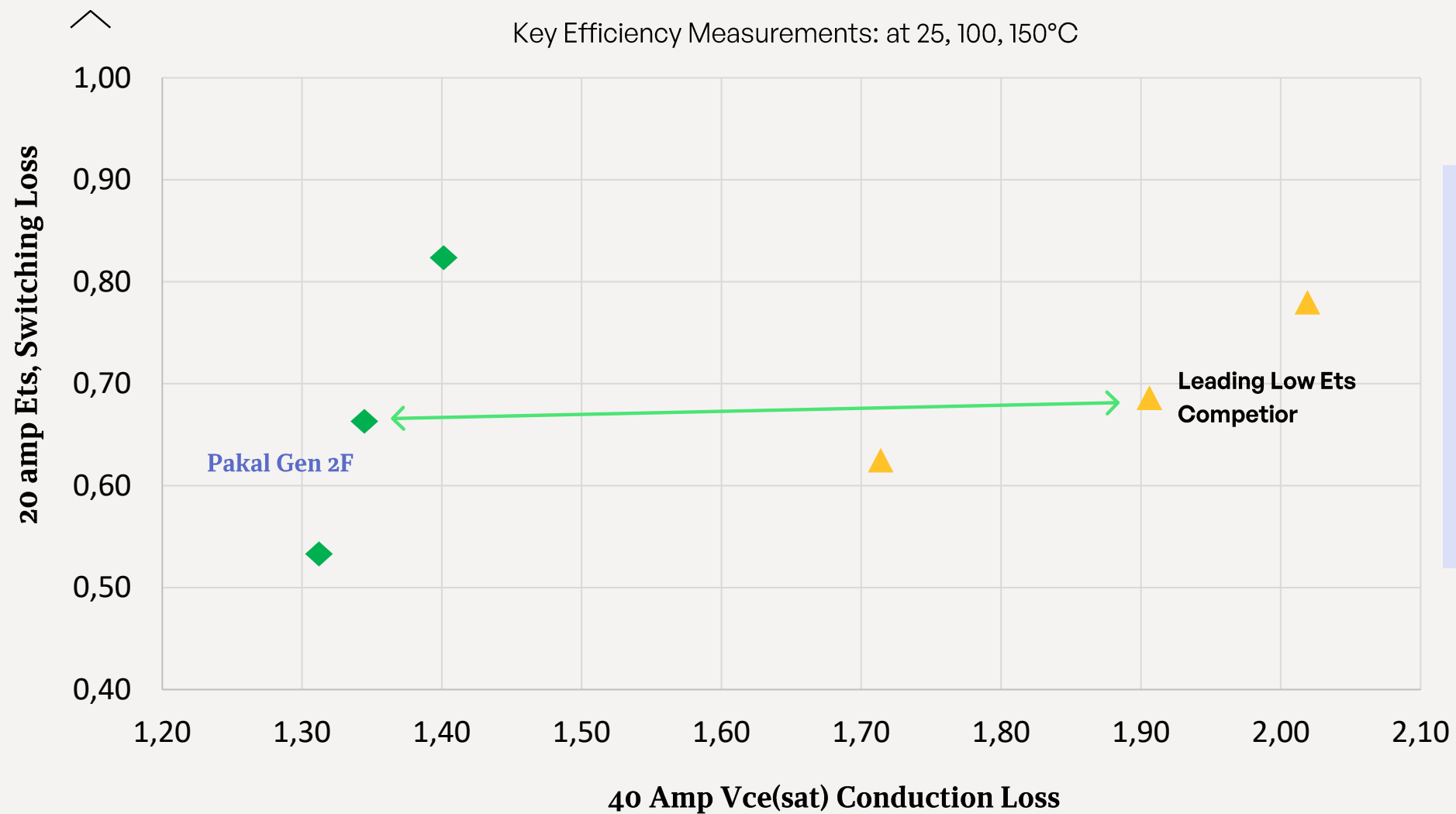
Gen 2.2 650 V 75 Amp Sampling Q1'24

Gen 2.5 650 V 50 and 100 Amp Sampling Q3'24

1200 V Samples available Q3'24

Measured results: 650 Volt 40 Amp Device Comparison

Pakal Gen 2F vs. Leading Low Ets Competitor

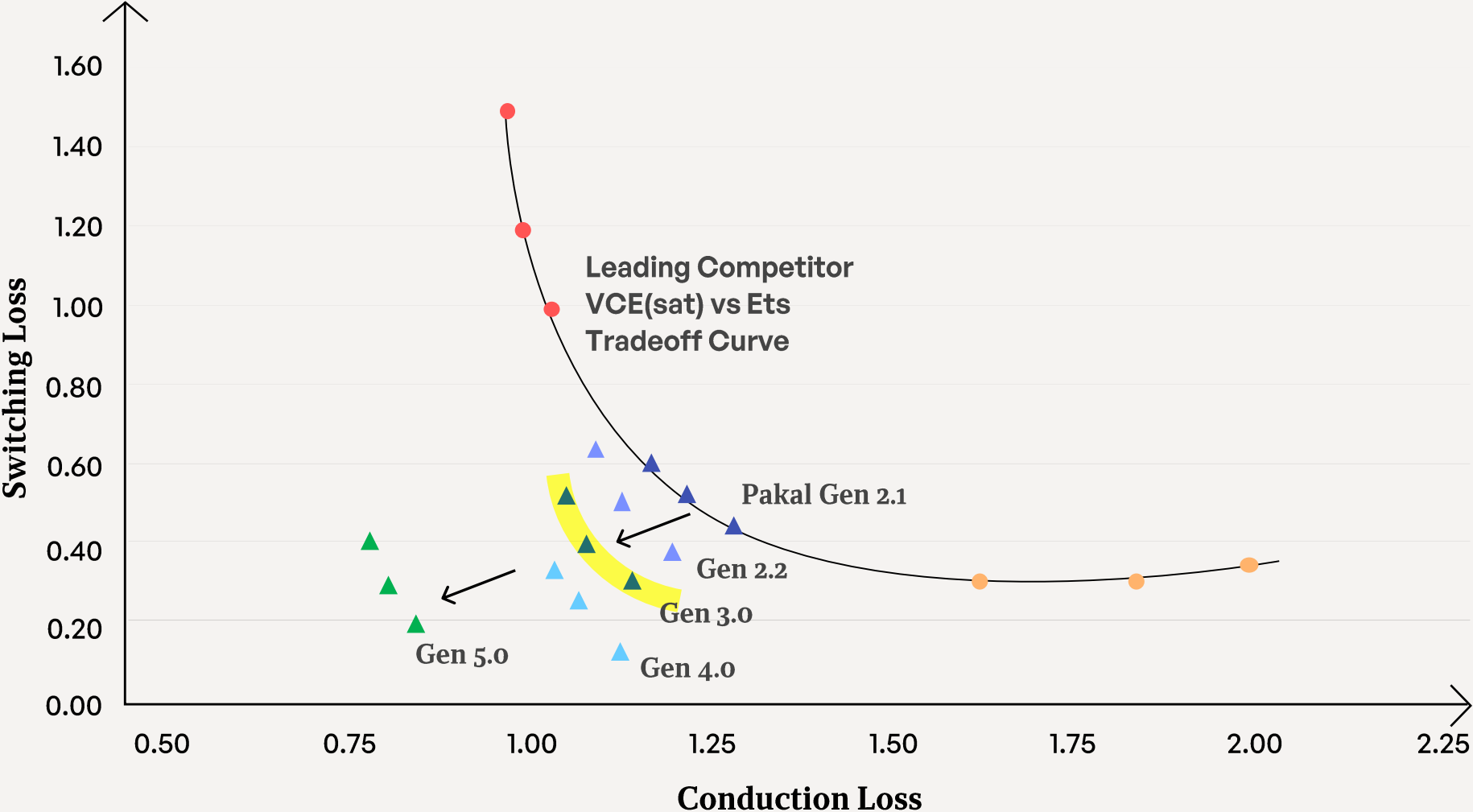


Pakal Gen 2F
vs.
Leading Low Ets
Competitor

At 100 C, Lower Ets
and much lower
conduction losses!

Long Term Roadmap:

Gen 4 and Gen 5 Extend Lead for Fast & Low Conduction devices at 650 and >1200 V



Gen 3.0 shifts the curve.

Gen 4 and Gen 5 extend silicon advantage and encroach on SiC results.

Thank You

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