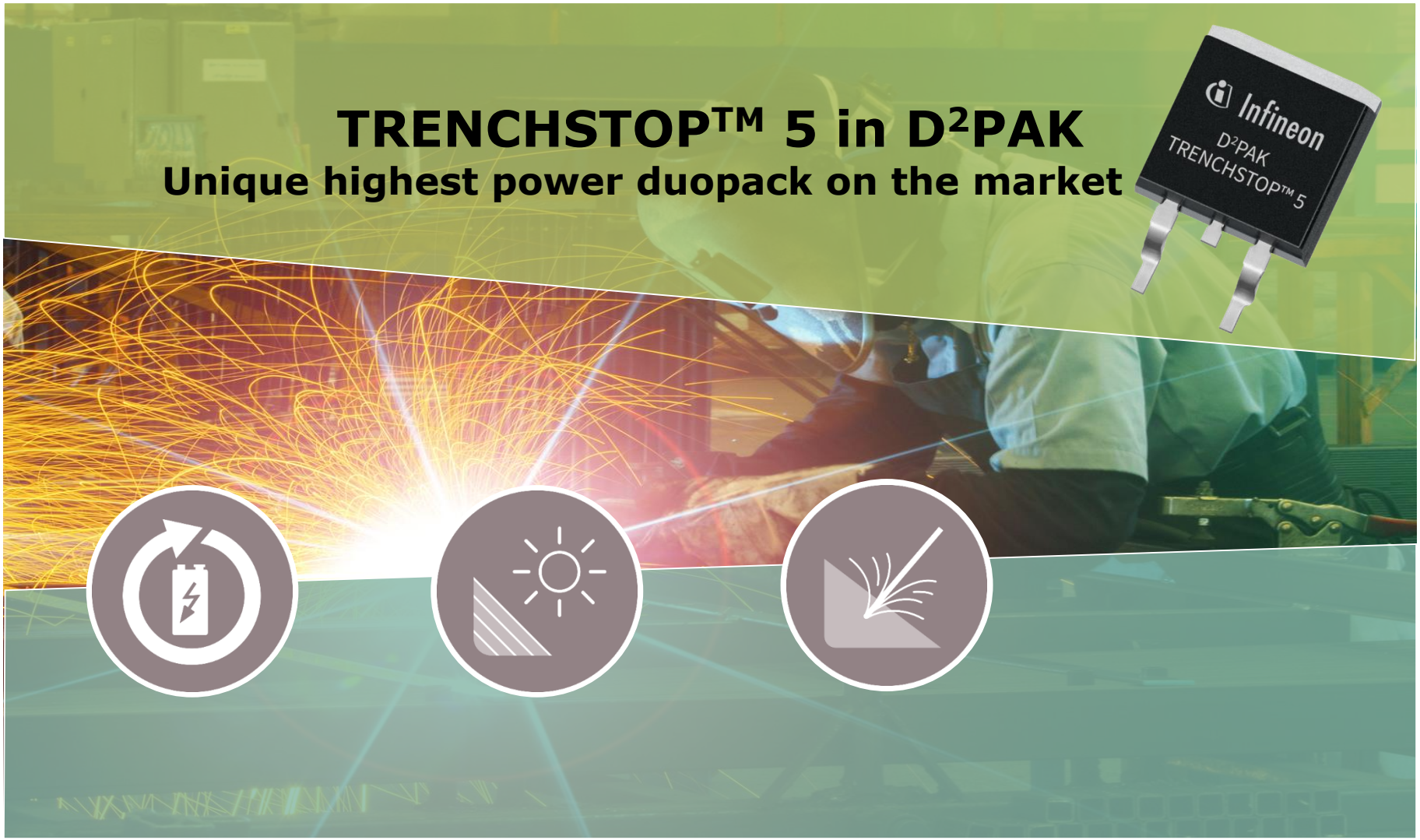
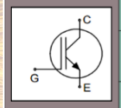
IGBT Discrete
650 V TRENCHSTOP™ 5
in D²PAK (TO-263-3)

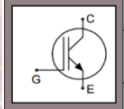
650 V TRENCHSTOP™ 5 in D²PAK
Focus applications



650 V TRENCHSTOP™ 5 in D²PAK
Competitor landscape in 650 V D²PAK IGBTs

The thin-wafer 650 V **TRENCHSTOP™ 5 technology** extends the use of SMDs to higher power range

		Competitor 1	Competitor 2	Infineon
Single IGBT				
	15 A			x
	20 A	x	x	x
	30 A		x	
	40 A	x	x	
	50 A			x

		Competitor 1	Competitor 2	Infineon
IGBT + diode				
	10 A			
	15 A			x
	20 A		x	x
	30 A		x	x
	40 A			x

Higher current density in small package are possible now

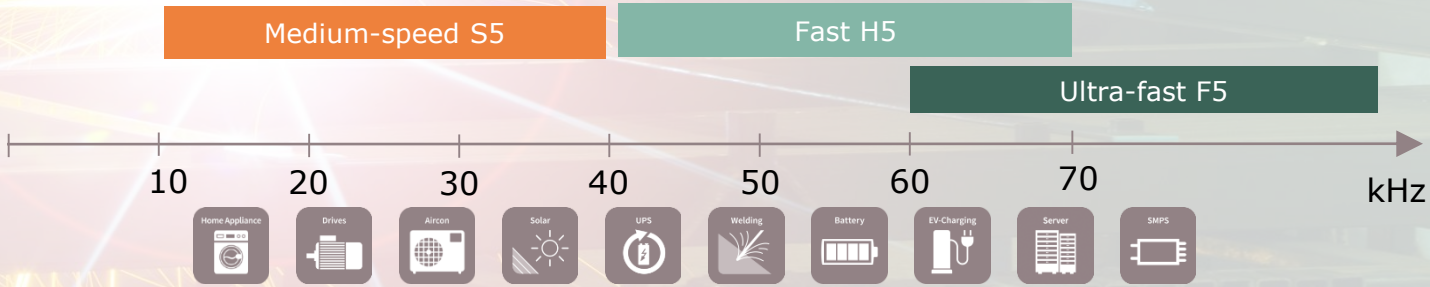
- Unique 50 A 650 V Single IGBT in D²PAK
  Unique 40 A IGBT co-packed with 40 A diode in D²PAK

650 V TRENCHSTOP™ 5 in D²PAK
Product Portfolio

IGBT I_{nom} 100°C [A]	diode I_F 100°C [A]	D²PAK S5	D²PAK H5	D²PAK F5
Single IGBT				
15	/	IGB15N65S5		
20	/	IGB20N65S5		
50	/	IGB50N65S5	IGB50N65H5	
Duopak (IGBT + diode)				
IGBT I_{nom} 100°C [A]	diode I_F 100°C [A]	D²PAK S5	D²PAK H5	D²PAK F5
15	15		IKB15N65EH5	
20	20		IKB20N65EH5	
30	30	IKB30N65ES5	IKB30N65EH5	
40	40	IKB40N65ES5	IKB40N65EH5	IKB40N65EF5

Unique 50 A single IGBT in D²Pak

Unique 40 A IGBT + 40 A diode in D²Pak



650 V TRENCHSTOP™ 5 in D²PAK
Thermal performance comparison

Test set-up

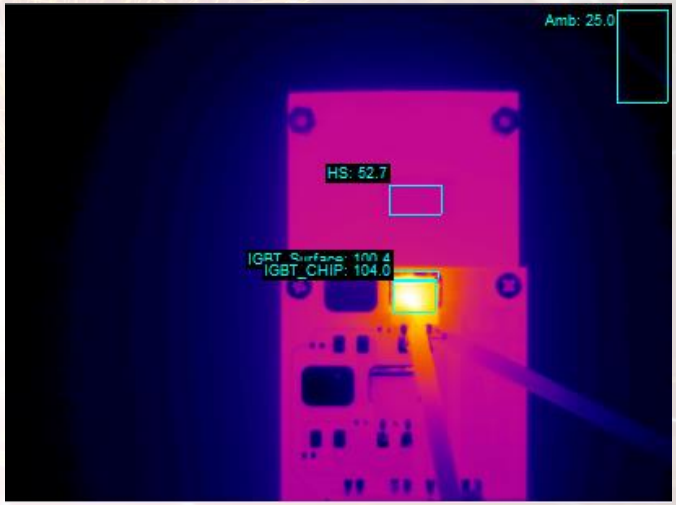
- Same heatsink size
- Same 50 A 650 V IGBT in D²PAK on IMS and TO-247 with isolation foil K4 or K6
- Same test conditions

Results

at Tj_{max}=~105°C:

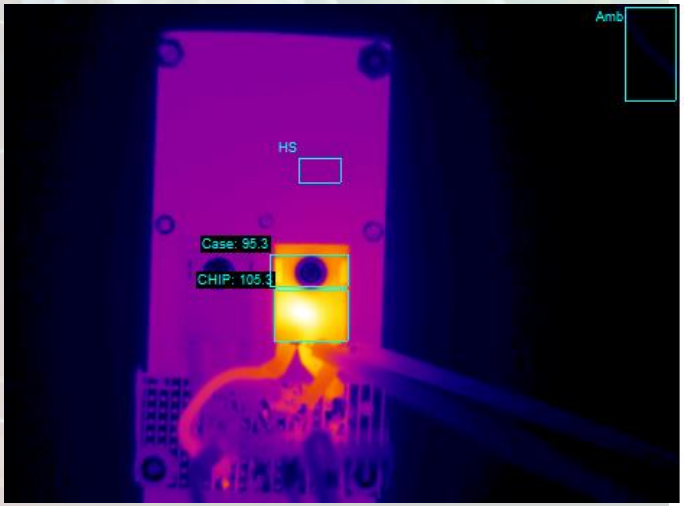
D²PAK on IMS **+51.3°C**
TO-247 + iso foil K4 +60.9°C
→ **9.6°C** lower ΔT

D²Pak



IMS: ΔT= T_j -T_{hs} =51.3°C; I=7 A; V=4.97 V.
IMS R_{th}≈1.47 K/W

TO-247



K4: ΔT=60.9°C; I=7 A; V=5.43 V.
K4: R_{th}≈1.6 K/W

! IGBT in **D²PAK** on IMS has ~10°C lower T_j than same chip in TO-247 with K4 isolation foil!

650 V TRENCHSTOP™ 5 in D²PAK
Thermal performance comparison

Test set-up

- Same heatsink size
- Same 50 A 650 V IGBT in D²PAK on IMS and TO-247 with isolation foil K4 or K6
- Same test conditions

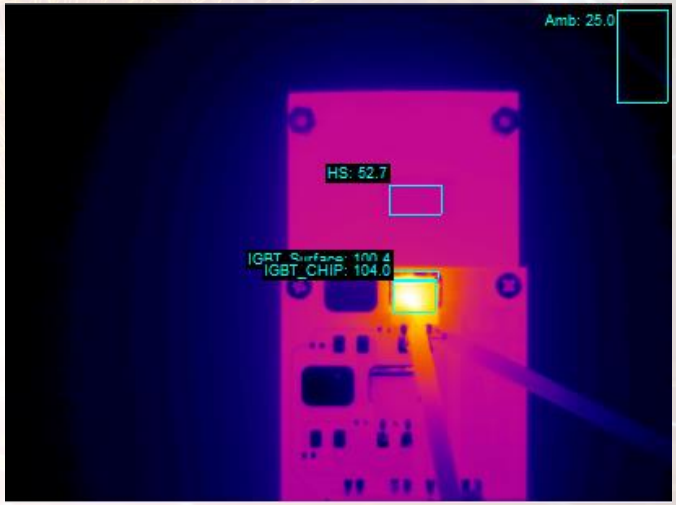
Results

at T_{jmax} =~105°C:

D²PAK on IMS	**+51.3°C**
TO-247 + iso foil K6	**+56.4°C**

→ **5.1 °C** lower ΔT

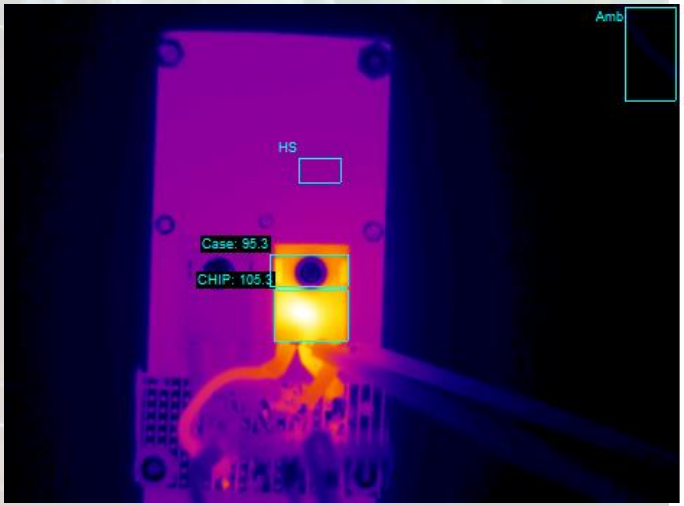
D²Pak



IMS: ΔT= T_j -T_{hs}=51.3°C; I=7 A; V=4.97 V.

IMS R_{th}≈1.47 K/W

TO-247



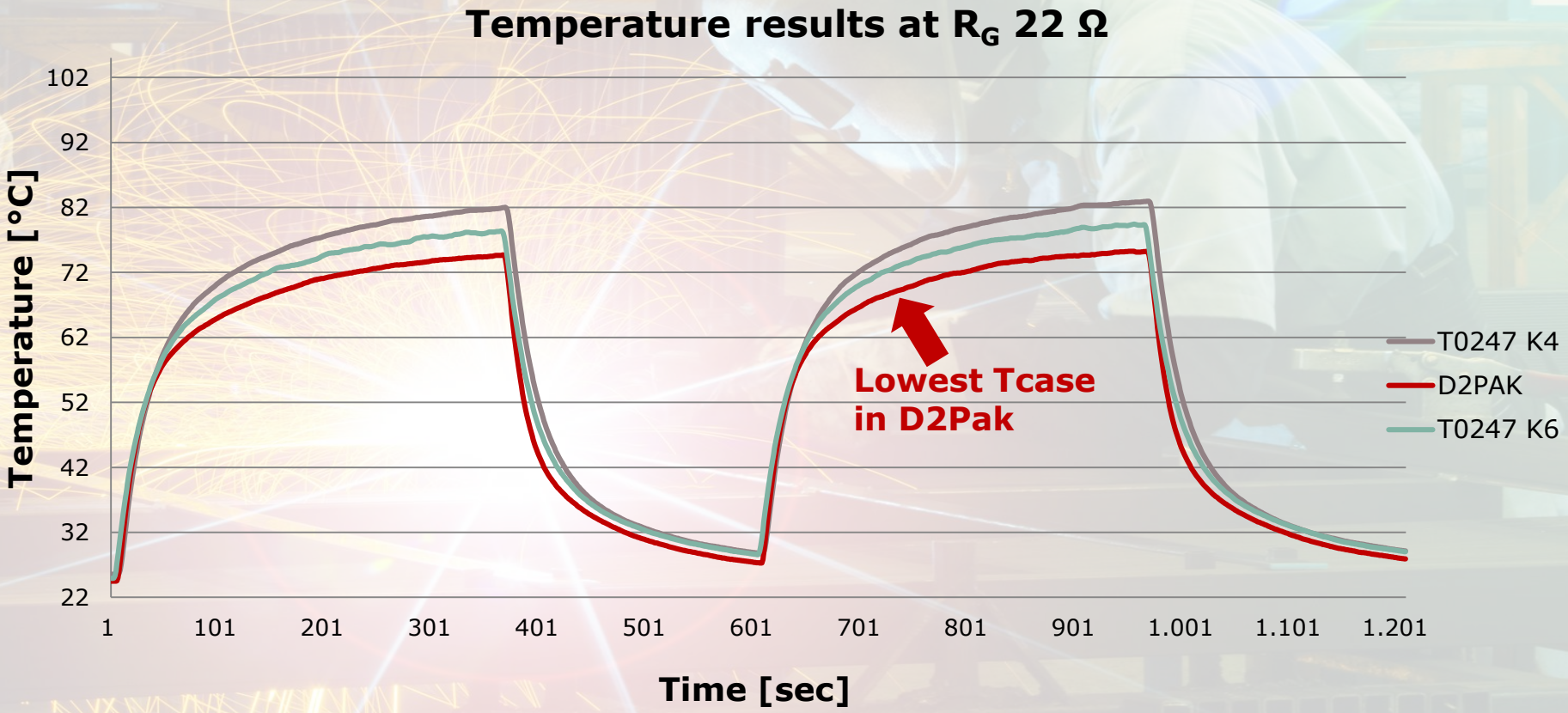
K6: ΔT=56.4°C; I=7 A; V=5.43 V.

K6: R_{th}≈1.48 K/W

! IGBT in **D²PAK** on IMS has ~5°C lower T_j than the same IGBT chip in TO-247 with K6 isolation foil!

650 V TRENCHSTOP™ 5 in D²PAK
Thermal cycling test

- Test was done as: 6 min on, 4 min off for two welding cycles
- *Test was done at ~3.5 kW (Grid voltage (230 V) welding/output current ~160 A)*
- D²PAK (R_{th}≈1.47) vs To247 (*Rth≈1.6*) **K4 Δ*T* max 10°C**
- D²PAK (*Rth≈1.47*) vs To247 (*Rth≈1.48*) **K6 Δ*T* max 5°C**



650 V TRENCHSTOP™ 5 in D²PAK
Features and benefits

Features	Benefits
Unique, highest power density	Higher power density designs
	Upgrade of existing platforms with D²PAK for up to 25% higher P_{out}
	Reduction of paralleling and system complexity
Low stray inductance (5 nH)	Total switching losses reduction
	Lower peak turn-off voltage → higher reliability
	Higher switching frequency → system size and cost reduction

650 V TRENCHSTOP™ 5 in D²PAK
General information

www.infineon.com/trenchstop5/trenchstop-5-in-d2pak/

- Datasheets
- Simulation Models
- Product Brief
- Application Note ” 650 V TRENCHSTOP™ 5 for 3.5 kW portable MMA welding demonstrator”

Part of your life. Part of tomorrow.