

EMS-TM-GR50

Graphene pad, 5.0 W/m·K through-plane, 0.25 mm to 5.0 mm

Die-cut compliant pad for the TIM2 plane; through-plane and in-plane figures are kept apart.

Die-cut graphene pad at 5.0 W/m·K through-plane, supplied 0.25 mm to 5.0 mm and cut to the drawing. Thermal resistance is published as low as 0.04 °C·cm²/W on the oriented grades, and the pressure and thickness behind that figure are not published, so the delivered batch condition is printed with the figure. The failure this class is selected against is the in-plane figure being read as a through-plane figure: an oriented grade is marketed at 130 W/m·K in the plane of the sheet, an order of magnitude above its through-plane value, and the two axes never share a row.

ORDERING INFORMATION

Part number	EMS-TM-GR50
Through-plane thermal conductivity	5.0 W/m·K
In-plane thermal conductivity	Not quoted for this grade; quoted per drawing on oriented grades
Thickness envelope	0.25 mm to 5.0 mm
Thermal resistance	Measured on the delivered batch; condition printed with the figure
Rebound resilience	Not published for this grade
Adhesive glue-point pattern	Count and layout per drawing
Packaging	Die-cut pads on release liner, bagged to the drawing; custom outline to supplied drawing

THERMAL PERFORMANCE, BY AXIS

Parameter	Value	Notes
Model code	EMS-TM-GR50	Ladder position: Compliant pad range 0.8–15 W/m·K.
Through-plane thermal conductivity	5.0 W/m·K	ASTM D5470 three-point regression. Conduction through the thickness, which is the path in a stack, and the only axis comparable with grease and pad figures. ASTM D5470 measures apparent thermal impedance at a controlled pressure and thickness; intrinsic conductivity comes from repeating the measurement at several thicknesses and regressing the results, where the intercept is contact resistance and the slope gives the conductivity. A conductivity figure without its pressure and thickness is not a specification.
In-plane thermal conductivity	Not quoted for this grade	Conduction along the plane of the sheet. Oriented graphene grades publish in-plane up to 130 W/m·K, and films of 40 µm to 2 000 µm publish 1 450 W/m·K or more. An in-plane figure is comparable with other in-plane figures only, and is never tabulated or compared with the through-plane figure in the row above.
Orientation and axis note	Through-plane is through the thickness; in-plane is along the sheet	Every figure on this datasheet states which axis it is on. The two conductivity figures never share a column or a row label, and no in-plane figure is printed beside a through-plane value.

Parameter	Value	Notes
Through-plane class range	0.8 W/m·K to 15 W/m·K across the custom pad range	The published band for compliant pad grades; this ladder runs 3.0 W/m·K to 15.0 W/m·K within it.
Thermal resistance	Measured on the delivered batch	Published as low as 0.04 °C·cm²/W on the oriented grades; the source does not state the pressure or the thickness behind that figure, so the condition is not published and the delivered batch condition is printed with the figure instead.
Test pressure and thickness of the resistance figure	Not published	The condition is not published, so the delivered batch pressure and thickness are printed with the figure. The row is stated rather than omitted.
Interface resistance across classes	Below 0.05 °C·cm²/W	Commercial grease and phase change materials reach this floor, so the gap between classes is narrower than the conductivity columns suggest.
Two grades a factor of 2 apart in W/m·K	Far closer than a factor of 2 apart in impedance	Buying above the stack's need buys nothing; conductivity is measured at a pressure and a thickness, and the stack sets both.

THICKNESS, MECHANICS, ASSEMBLY AND COMPLIANCE

Parameter	Value	Notes
Thickness envelope	0.25 mm to 5.0 mm	Ladder target rather than a published figure: the datasheet renders the delivered batch thickness at the stated pressure. The class range is 0.25 mm to 20 mm, so the same material covers a 0.25 mm film and a 20 mm pad. Measured to ASTM D374.
Thickness tolerance	Per the agreed drawing	Thickness tolerance is not published; the first-article drawing tolerance governs.
Rebound resilience	Not published for this grade	70 % rebound resilience is published on the oriented graphene grade. The compliant grades in this ladder publish no rebound figure. Rebound matters because dry solid-to-solid contact touches under 3 % of the apparent area, and a pad that springs back keeps filling that area after compression cycles.
Hardness and compression	Not published for this grade	ASTM D2240. The grade's hardness and its compression at the assembly pressure are quoted on the drawing.
Adhesive glue-point pattern	Count and layout per drawing	The number of glue points on the pad surface measurably changes its interface thermal resistance, documented by a supplier experiment on one of these grades: more adhesive means easier pick-and-place and a worse thermal path, and fewer glue points means the opposite. The drawing shows where the points sit. Where the assembly is placed by hand, a light tack on one face holds position.
Operating temperature range	Not published for this grade	Method IEC 60068-2-14; the range is quoted per drawing where the application sets one.
Oil bleed	Declared free of oil bleed	Graphene pads in this class are declared free of oil bleed, the contamination route silicone pads are measured on at 1 % maximum by filter paper.

Parameter	Value	Notes
Outgassing TML	0.170 %	Measured figures reported by ASTM E595 screening on a comparable published pad in this category. No pass/fail threshold is published, because the threshold is not confirmed from a primary source; the figures for the delivered grade are issued with its datasheet.
Outgassing CVC	0.010 %	Measured figures reported by ASTM E595 screening on a comparable published pad in this category. No pass/fail threshold is published, because the threshold is not confirmed from a primary source; the figures for the delivered grade are issued with its datasheet.
Compliance	RoHS 2011/65/EU · REACH SVHC candidate list	RoHS restricts ten substances at 0.1 % by weight per homogeneous material, with cadmium the exception at 0.01 %. The 2025 REACH SVHC candidate list runs to more than 240 substances and includes D4, D5 and D6. Certification and standard designations are named only. No certificate, registration, patent or file number is published, and no third-party approval document is in hand for a model in this family.
Flame rating	Quoted per drawing	No flame rating is published for the graphene grades, so UL 94 V-0 is quoted per drawing where the application requires it, and never assumed.
Die-cutting and first article	Die-cut to the supplied outline	First-article inspection record per order; sample lead time 5–10 working days.
Standards applied	ASTM D5470 · ASTM D374 · ASTM D2240 · ASTM E595 · IEC 60068-2-14	Standard designations are named. Certification and standard designations are named only. No certificate, registration, patent or file number is published, and no third-party approval document is in hand for a model in this family.

APPLICATIONS

- Warped lids and non-flat cold plates where the pad has to recover after compression cycles
- Stacks needing through-plane conductivity above the grease and pad bands
- Large gaps, where the same material covers a 0.25 mm film and a 20 mm pad
- Interfaces specified from a drawing rather than from a chemistry

COMPATIBLE WITH

- EMS-TM-G series thermal grease where the bond line is thin and the surfaces are flat
- EMS-TM-P series gap filler pads for the 1.0 mm to 6.0 mm band
- EMS-TM-PC series phase change pads where the transition window matches the loop
- Drawings specifying an adhesive glue-point pattern and a release liner

ORDERED AS

- A through-plane conductivity grade, a thickness and a die-cut outline
- An in-plane figure quoted separately, with its own pressure and thickness, where the drawing needs one
- A first-article inspection record against the supplied drawing

MODEL LADDER — GRAPHENE PADS

Parameter	Value	Notes
EMS-TM-GR30	3.0 W/m·K through-plane · in-plane not quoted	0.25–3.0 mm; ladder target
EMS-TM-GR50	5.0 W/m·K through-plane · in-plane not quoted	0.25–5.0 mm; ladder target
EMS-TM-GR80	8.0 W/m·K through-plane · in-plane not quoted	0.50–6.0 mm; ladder target
EMS-TM-GR120	12.0 W/m·K through-plane · in-plane not quoted	0.50–6.0 mm; ladder target
EMS-TM-GR150	15.0 W/m·K through-plane · in-plane not quoted	0.50–6.0 mm; top of the published custom pad range

TWO CONDUCTIVITIES, TWO ROWS, NEVER ONE

Parameter	Value	Notes
In-plane, oriented grades	130 W/m·K published top figure	Conduction along the plane of the sheet; comparable with other in-plane figures only
In-plane, films	1 450 W/m·K or more, 40 µm to 2 000 µm	Separate product form; never tabulated with a through-plane value
Through-plane, compliant pads	0.8 W/m·K to 15 W/m·K	Conduction through the thickness, which is the path in a stack; comparable with grease and pad figures
Thickness across the class	0.25 mm to 20 mm	The same material covers a 0.25 mm film and a 20 mm pad

NOTES

- Through-plane and in-plane conductivity never share a column or a row label. Every figure on this datasheet states which axis it is on, and an in-plane figure is not compared with a through-plane figure.
- Thermal resistance carries its test pressure and its thickness. Neither is published for the 0.04 °C·cm²/W figure, so the note column says the condition is not published and the delivered batch condition is printed with the figure.
- Outgassing is published as measured figures only, TML 0.170 % and CVCM 0.010 % by ASTM E595. No pass/fail threshold is published as a specification.
- Where the blueprint marks a figure as a ladder target rather than a published figure, the note column says so; the datasheet renders the delivered batch figure at the stated pressure.
- Scope: the TIM2 plane, lid or heat-sink base to cold plate and cold plate to manifold or rail. No coolant distribution units and no cold plates are supplied.
- Supplied by EMS-Trade Cooling, a Shenzhen trading house that integrates, inspects, stocks and ships. Die-cutting runs to the supplied drawing with a first-article inspection record per order. No manufacturing of this item is claimed.

Full specification sheet and current pricing
 EMS-Trade Cooling · ems-cool.com
 Typical lead time confirmed on order acknowledgement.

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