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Liebe Leserinnen und Leser!

Lassen sie uns heute keine politischen oder andersartigen Themen diskutieren, wir haben doch alle nur noch Sommer, Sonne & Urlaub im Kopf. Lassen sie mich von etwas sprechen, das mich seit 3 Monaten beschäftigt, nämlich der Frage, kann man Sonnenlicht künstlich erzeugen? Natürlich nicht mit der wahnsinnigen Strahlkraft und Energie der Sonne, aber doch immerhin mit dem Sonnenlichtspektrum. Diese Frage kann ich jetzt nach langem Studium und Fachliteratur, Firmenbroschüren und Aufsätzen eindeutig mit Ja beantworten. Ja, man kann künstliches Sonnenlichtspektrum erzeugen. Unser Kopf beherbergt eine unglaublich vielseitige „chemische Fabrik". Für das *Sehen* werden Botenstoffe und Hormone erzeugt oder aktiviert, für die *Farberkennung* genauso. Das gleiche gilt für das *Einschlafen*, wie das *Aufwachen*. Wenn Sie der Zusammenhang interessiert, ich schicke ihnen gern eine detaillierte Broschüre unserer Firma.

Der Auslöser dieser Untersuchung war, dass meine Firma euroLighting, eine zweite Firmengründung von mir, neben unserer 40-jährigen Endrich Bauelemente Vertriebs GmbH, Produkte vertreiben will, von denen der Hersteller behauptet, sie könnten ein dem Sonnenlicht sehr ähnliches Sonnenspektrum erzeugen. Da war Misstrauen wirklich angesagt, und wir haben als ersten Versuchsballon 100 Glühbirnen an Haushalte verschenkt, zusammen mit einem Fragebogen, diesen uns nach einer Woche ausgefüllt zurückzugeben, ohne dass die Probanden wussten, was wir eigentlich wissen wollten. Und der Erfolg war überraschend, denn 70% fühlten sich durch das neue Licht (in der alten Glühbirnenform) angeregt, konnten besser lesen, also die Schrift klarer erkennen, fühlten sich wesentlich wohler bei dem abendlichen Licht unter LED Beleuchtung, selbst bei 2700 K warmen Licht, sagten, dass sie weniger ermüdeten am Abend. Nur 30% fühlten sich weniger oder gar nicht angesprochen. Naja, es gibt halt Menschen mit unterschiedlicher Empfindlichkeit. Nach diesem ersten Test war ich neugierig genug, mich intensiv mit der Fachliteratur zu befassen und lernte, dass man auf der letzten „Light + Building" in Frankfurt schon einige Versuchsaufbauten mit sogenanntem „HCL Human Centric Lighting" ausgestellt hatte. Aber große Emotionen haben die Aussteller wohl leider nicht erfahren dürfen. Fachblätter haben nur spärlich dazu Stellung genommen. Beim Quellen studieren habe ich gelernt, dass wir tagsüber ein Hormon namens „Melatonin" erzeugen, das uns beim Einschlafen hilft und ruhig schlafen lässt, aber bei zu viel Fernsehen oder Arbeiten am Computer oder selbst beim Schauen ins Handy wird diese Melatoninerzeugung gestört, teilweise reduziert, weil diese Geräte blaues Licht ausstrahlen, das diese Melatoninbildung behindert. Wir haben dann Messergebnisse mit einem präzisen Gossen Messgerät an Fernsehern, Handys, Computern und Bildschirmen vorgenommen, und die Ergebnisse waren mehr als überraschend, denn die Messergebnisse waren durchweg schlecht und das schlimmste Licht sendeten die Stromsparlampen aus. Man wundert sich, dass die Regierung und alle, die etwas davon verstehen wollen, auf dem Energiesparlabel herumreiten, aber die Qualität des Lichtes, das diese Lichtquellen, also Computer, Schirme, Fernseher usw. ausstrahlen, ist völlig unbekannt. Es wird nicht bewertet und nicht benotet, und es wird nicht davor gewarnt. Die herstellende Industrie wird es wohl gewusst haben – hoffen wir es, aber deren Schweigen ist verständlich!

Vor dem Einschlafen erzeugen wir Melatonin, dann gibt es morgens ein Hormon, das zum Aufwachen beiträgt, in dem es auf das bläulich-weiße Licht in der Dämmerung der Sonne reagiert, tagsüber erzeugt der menschliche Körper Seratonin, das Glückshormon, das durch Essen von Schokolade angeblich gesteigert wird. Und sonst dreht sich die Hormonproduktion 24 Stunden lang, man nennt dies den „circadianen" Rhythmus, dem wir alle unterliegen und der uns höchste Leistungssteigerung zwischen 10 und 11 Uhr bringt und sie nach einem Abflachen um die Mittagszeit gegen 16 Uhr nochmals anschwellen lässt.

Denkt man 200 Jahre zurück, dann waren die meisten Menschen im Ackerbau tätig und damit den ganzen Tag dem Sonnenlicht ausgesetzt. Erst mit der Erfindung der Industrialisierung und der Erfindung des künstlichen Lichtes, also der Elektrizität, reduzierte sich dieser Sonnenkonsum auf ca. 10% beim Menschen heute, und dies führt zu Depressionen, Mangelerscheinungen bei Kindern, z.B. bei den Zähnen, oder Knochenabbau (Osteoporose) bei älteren Menschen. Der Mangel an Sonnenlicht erklärt so manches, was wir heute als Krankheitsursache noch gar nicht richtig erkannt haben, dabei wäre Sonnenlicht doch die beste Medizin und so billig. Aus diesen Erkenntnissen heraus, haben wir uns entschlossen, diese Produkte zu vertreiben, weil die Umrüstung auf diese neuen Leuchtmittel außerordentlich preiswert ist, sowohl im Haus, in Verwaltungsgebäuden, in Schulen, in Altersheimen oder Hospitälern. Da Zahlen mehr als Worte sagen, haben wir ein Beispiel ausgerechnet, z. B. ein Raum mit 60 m^2 (10 m×6 m), in dem wir 9 Deckenpanels je 40 Watt in unserer Computersimulation aufgehängt haben und dabei ausgezeichnete Lichtwerte erzielt haben. Vorgabe lt. Gesetz sind 500 Lux am Arbeitsplatz, direkt unterhalb und neben den Deckenpanelen hatten wir 630 Lux, in den Zwischenräumen 540 Lux und nur an den Wänden ca. 450 Lux. Erreicht wurde dies mit 9 Panelen mit zusammen 380 Watt und total 47000 Lumen. Das Ganze kann man zu einem Materialwert von knapp 1500 € erwerben (natürlich ohne Installationskosten). Dem gegenüber stehen die bessere Leistung der Mitarbeiter, weniger Krankheitstage, hohe Konzentration und ein generelles Wohlbefinden der Mitarbeiter. Dies sind doch Zahlen und Fakten, die nachdenklich machen! Vielleicht sind Sie dann auch so euphorisch nach einer Umstellung auf sonnenähnliches Kunstlicht, wie ich es wurde.

Wenn Sie mehr über diese Leuchtmittel wissen möchten, schreiben Sie mir bitte. Eine Email genügt an: w.endrich@endrich.com

Mit freundlichen Grüßen
W. Endrich

AEC-Q100 AUTOMOTIVE MEMS OSCILLATORS

SiTime introduced two families of ultra-robust AEC-Q100-qualified MEMS oscillators. The **SiT2024/25** and **SiT8924/25** oscillators deliver the highest performance and best robustness and are designed for ASIL (Automotive Safety Integrity Level) compliant automotive applications such as advanced driver assistance systems (ADAS), in-vehicle Ethernet, powertrain and electronic control units (ECUs).

"The automotive industry is going through a massive transformation, with new features such as advanced safety and driver assistance systems, electrification, automation and real-time big data analytics. The usage of electronic components in automobiles is increasing rapidly and requires stringent levels of quality, reliability and performance," said Piyush Sevalia, executive vice president of marketing at SiTime. "MEMS technologies are playing a significant role in this transformation. SiTime is leveraging our revolutionary silicon MEMS, advanced analog technology and standard semiconductor packaging to provide unique timing solutions that deliver the highest reliability and dynamic performance under extreme temperatures, shock and vibration."

SiTime's new automotive product families offer a unique combination of the widest frequency range, tightest stability at ±20 ppm and the best reliability. The SiT2024/25 oscillators are optimized for under-the-hood systems such as engine control, transmission control, active suspension control, electronic steering and other ECUs. These oscillators are available in a SOT23-5 leaded package to enable visual inspection and the best solder joint reliability, especially in hot and cold environments. The SiT8924/25 oscillators, available in industry-standard QFN footprints as small as 2.0 x 1.6 mm, are ideal for camera modules and other small form factor systems.

About the SiT2024/2025 and SiT8924/8925 Oscillators

SiTime's automotive oscillators are 30 times more robust than quartz oscillators and deliver the following features and benefits.

FEATURES

- AEC-Q100 qualified, Grade 1 (-40°C to +125°C), Grade 2 (-40°C to +105°C) and extended temperature range (-55°C to +125°C)3-wire version with a short-circuit protected open-drain output
- SiT2024/2025: SOT23-5 leaded package for best board-level solder-joint reliability and ease-of-use in manufacturing and testLow current consumption of typ. 1.6 mA
- SiT8924/8925: Five package options in industry-standard oscillator footprint
- Excellent frequency stability at ±20 ppm for best timing margin
- Highest reliability at over 1 billion hours MTBF (< 1 FIT)
- Best shock resistance at 50,000 g
- Best vibration resistance at 70 g
- Lowest vibration sensitivity (g-sensitivity) at 0.1 ppb/g
- Widest frequency range of 1 to 137 MHz with 6 decimal places of accuracy
- Unique, programmable output drive strength for EMI reduction
- Supply voltage options of 1.8 V, 2.5 to 3.3 V

The SiT2024, SiT2025, SiT8924 and SiT8925 oscillators are in production now. Pricing information and Production Part Approval Process (PPAP) documentation, compliant with the AIAG manual, is available upon request.

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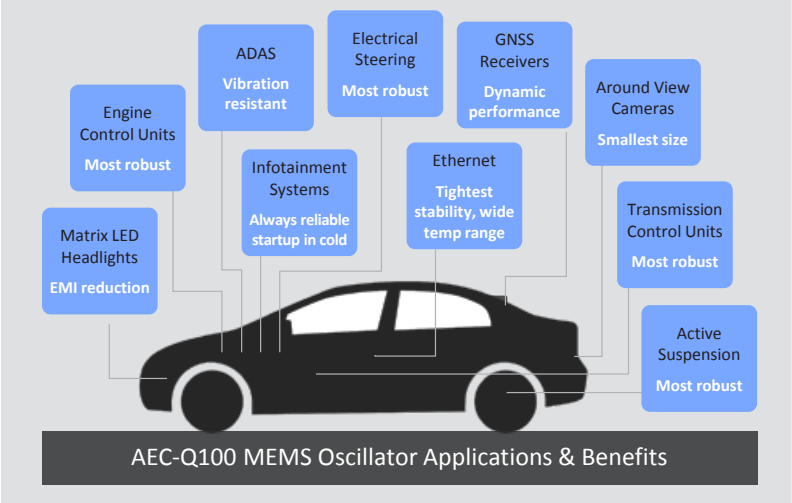
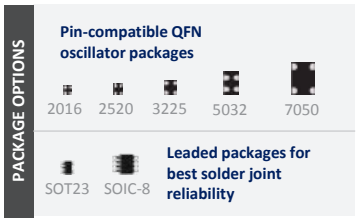
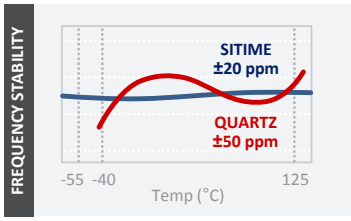
AEC-Q100 AUTOMOTIVE MEMS OSCILLATORS

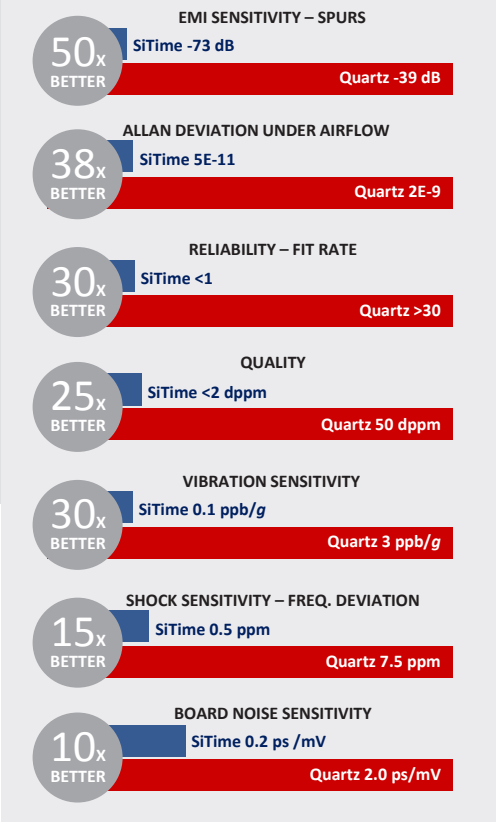
APPLICATIONS AND PERFORMANCE

MEMS automotive solutions are engineered to guarantee the best frequency stability, Allan deviation, jitter, and phase noise under environmental stressors such as rapid temperature changes, airflow, shock, vibration, and noisy power supplies.









Device Type	Device	Frequency (MHz)	Temp. Range (°C)	Stability (ppm)	Output Type	EMI Reduction Feature	Package Size (mm)
QFN Oscillators	SiT8924 [1]	1 to 110	-40 to 85, -40 to 105, -40 to 125, -55 to 125	±20, ±25, ±30, ±50	LVCMOS	8 output drive strength options	QFN: 2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5, 5.0 x 3.2 7.0 x 5.0
	SiT8925 [1]	115.2 to 137					
SOT23 Oscillators	SiT2024 [1]	1 to 110					SOT23-5: 2.9 x 2.8
	SiT2025 [1]	115.2 to 137					
Differential Oscillators	SiT9386 [1,2,3]	1 to 220	-20 to 70, -40 to 85, -40 to 95	±10, ±20, ±25, ± 50	LVPECL, LVDS, HCSL	-	QFN: 3.2 x 2.5, 7.0 x 5.0
Spread Spectrum Oscillators	SiT9025 [2]	1 to 144	-40 to 85, -40 to 105, -40 to 125, -55 to 125	±20, ±25, ±30, ±50	LVCMOS	48 spread options up to ±1.25%, down to -2.5%	QFN: 2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5 SOT23-5: 2.9 x 2.8

1. Contact SiTime for ≤±10 ppm stability options. 2. Contact SiTime for AEC-Q100 compliance status. 3. Contact SiTime for 95°C & 105°C products.

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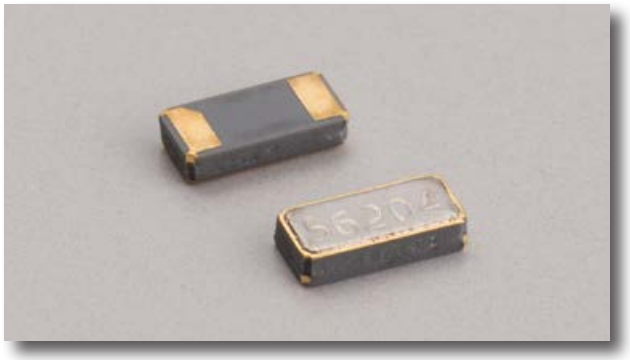
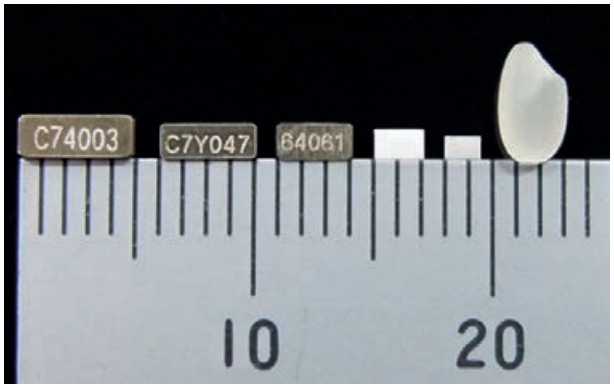
CM315G SERIES– CITIZEN OVERCOMES THE LIMITS OF FREQUENCY STABILITY

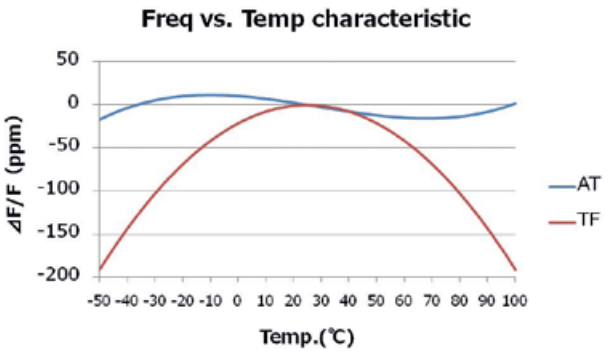


In the course of the continuous miniaturization of electronic devices, the formfactor of the components used must also be further reduced. This also applies to tuning fork quartz. Citizen Finedevice, as one of the trend setters, offers kHz tuning fork crystals down to 1.6×1.0 mm. These can be found in application, as household, metering, mobile phones and many more products, which provide date and time information.



The time reference for these products is generated by the tuning fork quartz with a widely used reference frequency of 32.768 kHz. The final clock information can be generated by dividing this reference by multiple of factor 2.

Talking about applications using wireless communication (M^2M, IoT, Metering …), stability, frequency tolerance over the temperature range of the kHz crystal, is an important feature to synchronies receiver and transmitter. Precise synchronization in systems using duty cycling, result in short weak up time and keep the sleep time long in other words save system power. In particular important for battery powered applications. The Stability over Temperature range is mainly determined by the quartz material and in particular the cutting angle (To carve out wafer from rude ore of crystal with appropriate angle to get the quartz blank. According to a square normal parabola, the frequency drift over temperature is typically -0.034 ppm/°C² (XY-CUT). Compared to the quartz in the MHz range, which mainly use the AT cut, the drift is unequally higher.



As one of market leader in kHz crystals products, Citizen Finedevice has succeeded in designing of first prototypes of a kHz quartz, whose frequency versus temperature profile corresponds to the third-order cubic profile of MHZ ATcut quartz crystals. And improve the stability in temperature range significantly by a factor of 2 ~ 3 compared to the conventional versions. A decisive improvement, previously valid limits for the temperature drift are overcome.

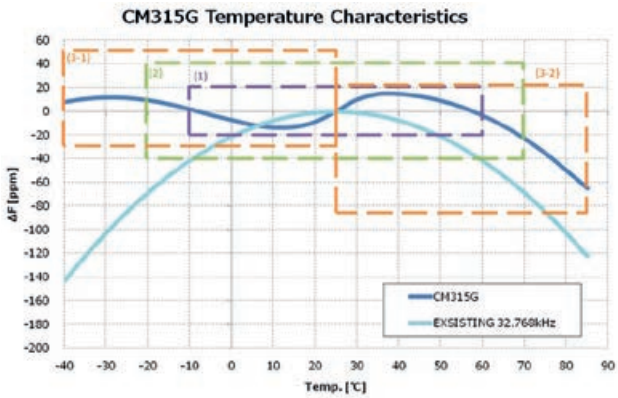
First tests of the CM315G results prove:

Temp.Range (1) -10 °C +60 °C: ±20ppm

Temp.Range (2) -20 °C+70 °C: ±40ppm

Temp.Range (3-1) -40 °C +25 °C: -30 ppm...+50 ppm

Temp.Range (3-2) +25 °C+85 °C: +30 ppm...-85 ppm



The frequency tolerance at 25 °C is approx. 20ppm. Equivalent Series Resistance (ESR) corresponds to the usual 70 kΩ for SMD 3.2×1.5×0.9 mm.

The CM315G is particularly suitable for applications as smart metering, or wireless communication modules, in which an exact time synchronization is required in order to save battery power.

Citizen announces first availability of samples for early July 2017. Serial production is scheduled for the second quarter of 2018.

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TFT-DISPLAYS WITH HDMI-AND RASPBERRY PI-INTERFACE

Raystar introduced a series of **TFT-Displays** with HDMI input. This TFT display series is available in the sizes 5.7", 7.0" (with two different resolutions) and 10.1". With its USB interface resistive touch panels it's easy to realize a human machine interface for Raspberry Pi, mini-PCs and every standard computer. Additional to the standard HDMI plug the TFTs are equipped with the standard 40 pin Raspberry Pi interface for easy plug and play. As option the board is available with 40 GPIO pins controlled by USB. For this display series a single voltage of 5 V at 1 A is required for backlight, touch panel and the TFT.

Modules with capacitive touch are under development and will be available soon. No touch versions are procurable on request.

FEATURES

- Compatible with Raspberry Pi 40 pin connector
- Single voltage at 5V for touch panel, backlight and TFT-display
- Standard HDMI connector
- 40 GPIO pins with USB interface
- Usage with mini-PCs and "normal" computers possible
- Supports RTP over USB interface
- LED lifetime up to 50k hours
- Operating temperature up to -20°C to +70°C

RAYSTAR TFT-DISPLAYS WITH HDMI-AND RASPBERRY PI-INTERFACE

SIZE	PART NUMBER	RESOLUTION	BRIGHTNESS	TECHNOLOGY	HDMI INTERFACE	40 PIN RASPBERRY PI	OPERATING TEMPERATURE	RESISTIVE TOUCH
5.0"	RFF50XB-1IW-DHS	800 × 480	350 cd/m²	TN	•	•	0°C ... +70°C	USB
7.0"	RFF70XG-1IW-DHS	800 × 480	320 cd/m²	TN	•	•	-20°C ... +70°C	USB
7.0"	RFH70XB-1IW-LHS	1024 × 600	400 cd/m²	TN	•	•	-20°C ... +70°C	USB
10.1"	RFK101XF-1AH-LHS	1280 × 800	800 cd/m²	IPS	•	•	0°C ... +50°C	USB

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ELECTROMECHANICAL INPUT DEVICES – BUT WHICH

When it comes to input devices or man-machine interfaces, touch screens are currently clearly in the focus. Despite its advantages, a keyboard is still the better alternative for many applications. And here, too, there are up-to-date solutions beyond the traditional keyboard, as known from computer and laptops.

In contrast to electromechanical input systems, touch screens offer the advantage, that their service life does not depend on the wear of electromechanical contacts. It is also highly interesting, in terms of design and hygiene, when the input system is directed outwards, e.g. is completely covered by glass. But not every application needs a real "touch" operation. Depending on the application, this is also not desired,

since a real tactile shifting feeling can not be represented in the form of pressure point and stroke. Therefore, even when no cognitive operation is possible, conventional electromechanical solutions are the first choice.

But what is "conventional"? Under the term "keyboards" is recapped the first approximation between keyboards of individual components (discrete keys) and flat input systems (membrane keypads, silicon mats).

KEYBOARD FROM INDIVIDUAL COMPONENTS

Speaking of a keyboard, one usually thinks first of all to a computer or laptop. Such a keyboard is characterized in that the variety of keys is rather small, but certain key stroke or operating force requirements must be met. These can be most easily realized by using individual keys.

However, the construction with discrete pushbuttons has a substantial disadvantage in handling. A plurality of individual components must be soldered onto a printed circuit board, and each soldering point is a critical point in term of keyboard reliability. Each button head needs an individual print, which causes costs for material management and storage. And finally, the design must find solutions to secure the comparatively bulky structures safely in or on the device.

KEYPAD

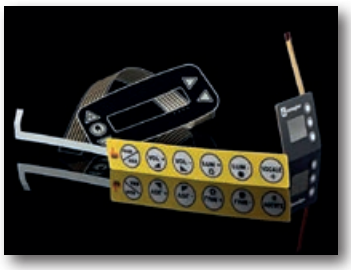
Keypads are often found on sports equipment such as ergometers, cross-trainers or treadmills, vending machines, robust portable devices, such as mobile measuring devices, robotic lawnmowers, or the like. Visible to the operator is a plastic film – if necessary with windows behind which are displays, numerical displays or light-emitting diodes. This front foil (also called a graphic film) is very frequently embossed in order to give the operating finger a certain guidance in the region of the keys. Conventionally, keys are encircling edge embossments, areal embossments on the entire key and embossed bubbles. Even if a key printing is desired in the Braille code – for example, when the application is used in the public space – the embossing of the front foil is recommended.

The synonym "graphic foil" clearly points to significant advantage: The graphic design possibilities are almost unlimited! In contrast to the keyboards made of individual components, which only allow round or rectangular buttons, any key contours can be realized without additional costs. Colours can be used at customer's option for logos, "corporate design" or the optical layout of the surface.

The printing always takes place from the back, so that no one has to worry about abrasion resistance. *Picture foil stencils offer a wide range of design possibilities.*

Polyester or polycarbonate film is used as a starting material for front films – materials which are temperature-resistant and resistant to all kinds of influences. They make the keyboards oil-resistant for applications in the production or workshop, for example, or they provide the UV resistance of the colours in outdoor use. In addition to the various embossing and imprinting variants, the designer can also choose from different structures: glossy, matt or textured – even a combination, e.g. a matt film with a high-gloss button head is possible.

Finesse such as electrical shielding, interchangeable inscriptions, various illuminations etc. extend the possibilities of use again. On the back, a self-adhesive layer closes the membrane keypad. The mounting of the keyboard is therefore quite simple!



Picture pull off protective paper, lay cables, glue on - the mounting of a keypad is very easy and fast.

By the way, an effect such as touch buttons or "touch panels" can also be achieved with membrane keypads. If the stroke is made quite small, there's no noticeable stroke or pressure point – and the evaluation remains simple: Since

ELECTROMECHANICAL INPUT DEVICES – BUT WHICH

these are "correct" electromechanical contacts, neither auxiliary energy nor controllers are necessary.
This means: Lower costs, simpler design and higher energy efficiency. There's drawback, however, - the third dimension: if the keypad is not only long and wide, but also "high" with regard to key shape and/or stroke, then a foil is physically bounded. Silicone keys, on the other hand, can also go up to several centimetres.

SILICONE KEYPAD

Silicone mats are e.g. for remote controls in the multimedia area. Exactly how one expects that of silicone rubber, thus larger strokes and thus a characteristic tactile feedback can be achieved. Actuation distances of up to 4 mm can be easily realized.

The robust silicone mats allow large key strokes.

To ensure, that the system works not only mechanically but also electrically, a conductive disc (or several of them), of carbon (carbonpill), alternatively of different conductive material mixtures or even gold surfaces, is located on the underside of each button. The latter has a lower resistance, which reduces the power consumption and thus increases the runtime of the application – a plus especially for battery powered devices.
The counterpart is mounted on a circuit board underneath the mat: a structure, usually in the form of two mutually inserted combs, the conductor sections of which are short-circuited at the push of a button by the disc.
Material-inherent properties of silicone rubber, such as a wide application temperature range and a simple, and thus low-cost, moldability, also have a positive effect.
The long life span of the keypads often speaks for silicone. This makes it all the more important, of course, to have a permanent solution for key inscription – because what is the use of the longest-lasting keyboard, if no one knows what's on it? Abrasion resistant screen printing processes, various coatings (from lacquering to PU coating) as well as laser inscriptions are suitable solutions. In combination with different rubber colours (also several per keypads are possible) and lighting thus an attractive possibility to design the silicone mats.
And when it comes to something else: a keypad with front panel and stainless steel buttons, clad in steelwork, looks robust to the outside, the substructure is a cost-saving flat keyboard.

Metal keyboards can be individually customized in small quantities.

COMBINATIONS OF SEVERAL TECHNOLOGIES

Not quite, but a little different are keyboards that combine the features of the last described or other technologies.
Possible applications are, for example, in medical technology and in the care sector, where distinctive habit is necessary while at the same time good cleaning possibilities.

INDIVIDUALITY IS TRUMP

Input systems based on the touch principle open up completely new fields of application and also offer concrete advantages. However, the majority of the applications can equally be reliable operated with the contacting methods described here in a cost-effective manner. Decisive for each solution is the individual adaption to the respective application. This applies to dimensions as well as environmental requirements or design requirements. In order to achieve the optimum in terms of requirements and costs, the specialists for membrane keypads and silicone mats knitter-switch supports at the customer's site. The manufacturer has been specialized in switch technologies for more than 50 years. Customers benefit from state-of-the-art products, many years of experience and extraordinary competence. Knitter-Switch develops all solutions in Germany and therefore offers a simple on-site support and fast coordination. Production in Asia allows for innovative products at competitive prices.

In addition to the broad standard portfolio, knitter-switch also implements individual solutions that meet every requirement.

WHEN NOW WHICH KEYBOARD?

A certain structural height, which may have a long life, and at low cost, is offered by the silicone mats. If the graphic design is very important, the membrane keypad is the object of choice – just as much as simple assembly or the achievement of a certain seal. A keyboard of discrete keys is only recommended for very specific applications, e.g. computer keyboards. On rubber or on membrane keypads you will still not be able to type longer texts in a flowing and fatigue-free manner.

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NEW TYPES OF VIBRATION MOTORS – LINEAR TYPES

FEATURES

- Width between 2,8 mm and 5,4 mm
- Length between 12 mm and 43,5 mm
- Rated Voltage between 1.8 V and 90 V square wave or sine wave
- Vibrating force in X or Z direction
- Tape&reel packaging for fully automated processing
- Meet the requirements of thinner thickness and big vibration intensity
- Quick response, less accelerating time, directional vibration, and strong human-computer interaction induction effect
- Better stability, safety and reliability
- Quiet movement and small noise
- Operating temp. range: -20°C ... +70°C (+60°C coin type)

APPLICATIONS

- Haptic feedback devices, e. g. mobile phones

SPECIFICATIONS (T_{OP}=25°C)

APPEARANCE	PART NUMBER	DIMENSIONS (mm)	RATED VOLTAGE (V)	OPERATING VOLTAGE (V)	MAX. RATED CURRENT (mA)	FREQUENCY (Hz)
	LV061228B	12×6×2.8	2.0 Vrms, square or sine wave	0 ... 2.1 Vrms	135	200±10
	LVM061530B	15×6×3	2.0 Vrms, square or sine wave	0 ... 4 Vrms		200±10
	LVM061930B	19×6×3	2.0 or 2.35 Vrms square or sine wave	0 ... 4 Vrms		180±12
	G0832008	ø8×3.25	1.8 Vrms AC, sine wave	0.1 ... 1.8 Vrms AC	80	235
	PV4403A-01-W2	43.5×5.4×2.85	90 Vpp, sine wave	0 ... 120 Vpp, sine wave	8	197 ... 237

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