

Intercarrier Mixer and AM-Demodulator for TV and VCR

Features

- Very high input sensitivity
 - Excellent signal-to-noise ratio
 - Intercarrier output signal gain controlled and independent from the picture carrier to sound carrier ratio
 - AM demodulator alignment free
 - Few external components
 - ESD protected
- Case: DIP14**

Block Diagram

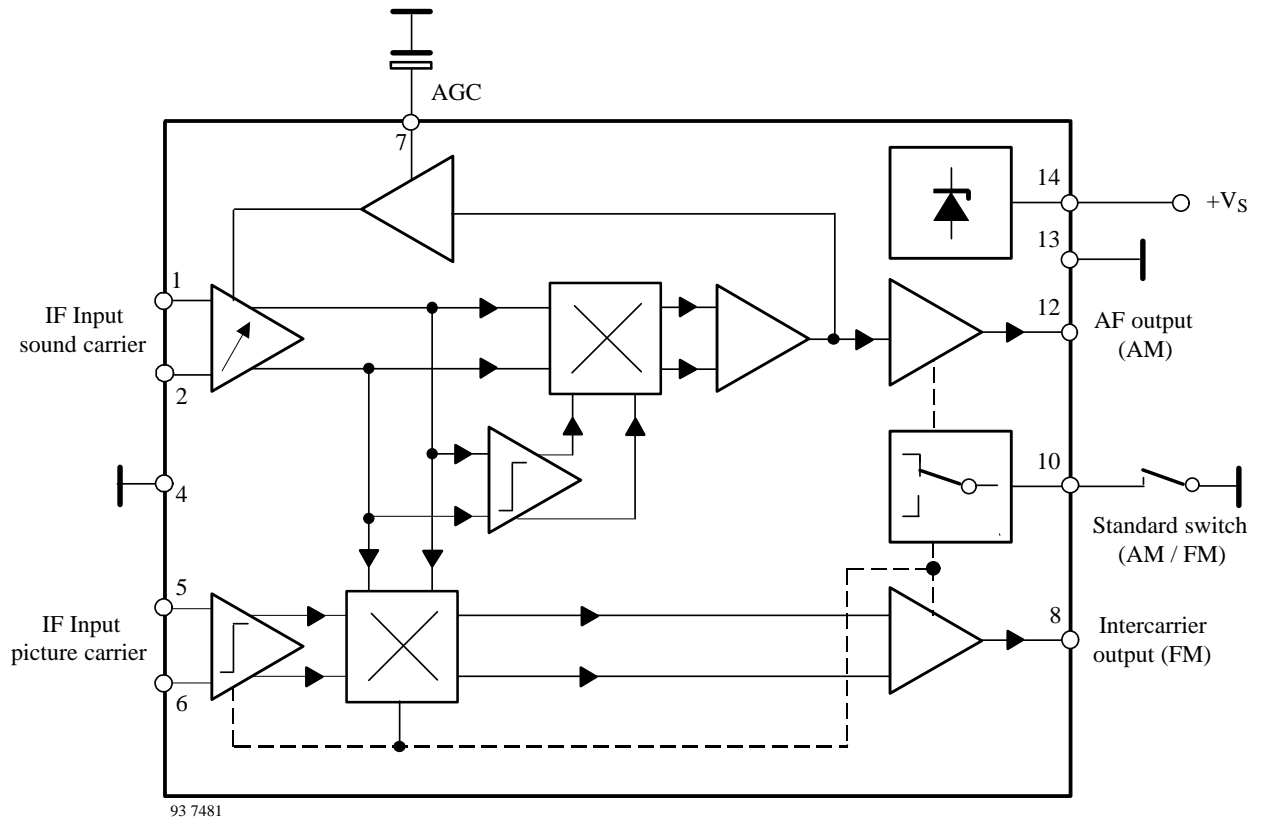
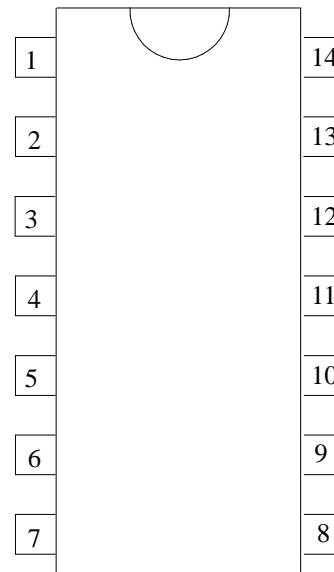


Figure 1.

Pin Description

| Pin | Function |
|----------|----------------------------|
| 1, 2 | IF input (sound carrier) |
| 3, 9, 11 | No connected |
| 4, 13 | Ground |
| 5, 6 | IF input (picture carrier) |
| 7 | AGC time constant |
| 8 | Intercarrier output |
| 10 | Standard switch |
| 12 | AF output (AM) |
| 14 | Supply voltage |



Circuit Description

The bipolar circuit TDA4483 enables high quality sound IF processing for multistandard applications in TV-sets and VCR. This circuit has separate inputs for the sound and picture carrier. The sound carrier signal (single or dual carrier, modulated with AM, FM or NICAM) from the SAW filter will be fed into a 3-stage, gain controlled, IF amplifier (Pin 1 and 2).

The following two mixer stages operate using different standards. In the case of AM, the first mixer works as a quasi-synchronous detector providing the audio frequency at Pin 12. Furthermore, the first mixer supplies a regulation voltage to control the gain of the 3-stage IF amplifier (AGC).

The second mixer stage works as an intercarrier mixer in FM/NICAM mode and supplies the intercarrier signal at Pin 8 (difference signal between picture and sound carrier) independent of the picture carrier to sound carrier ratio. In standard B/G the 5.5/5.74 MHz subcarrier is

available at Pin 8. The required picture carrier for the intercarrier mixer will be coupled out from the tuned demodulator circuit of the vision-IF IC (e.g. TDA4453 or equivalent components). The selective and prelimited picture carrier has to be applied symmetrically to the picture carrier input (Pin 5 and Pin 6). An additional limiting amplifier delivers the regenerated picture carrier to the intercarrier mixer.

Possible modes of operation (FM/NICAM or AM) are determined by the voltage level that is applied to Pin 10 (standard switch). Without external control voltage at Pin 10, the FM/NICAM operation is automatically selected. In the case of AM, the intercarrier output Pin 8 is switched off, however DC output voltage remains. In corresponding with FM/NICAM operation, the AF output Pin 12 is switched off.

Absolute Maximum Ratings

Reference point Pin 13 (4), unless otherwise specified.

| Parameters | Symbol | Value | Unit |
|--------------------------------|-----------|-------------|------|
| Supply voltage Pin 14 | V_S | 13.5 | V |
| Supply current Pin 14 | I_S | 50 | mA |
| Power dissipation | P_{tot} | 680 | mW |
| Junction temperature | T_j | 125 | °C |
| Operating temperature, ambient | T_{amb} | -25 to +70 | °C |
| Storage temperature | T_{stg} | -25 to +125 | °C |

Thermal Resistance

| Parameters | Symbol | Value | Unit |
|------------------|------------|-------|------|
| Junction-ambient | R_{thJA} | 90 | K/W |

Electrical Characteristics

$T_{amb} = 25^\circ\text{C}$, $V_S = 12\text{ V}$, reference point: Pin 13 (4), unless otherwise specified

| Parameters | Test Conditions / Pins | Symbol | Min. | Typ. | Max. | Unit |
|--|--|------------|----------|------------|--------------|---------------|
| Supply voltage range | Pin 14 | V_S | 10 | | 13.5 | V |
| Supply current | FM-mode AM-mode Pin 14 | I_S | | 37 32 | | mA |
| DC output voltage | Pin 8 Pin 12 | V_O | | 3.6 3.2 | | V |
| Standard switch Pin 10 | | | | | | |
| Control voltage | AM-mode FM-mode Pin 10 open | V_{CTRL} | 0 2.2 | | 1.5 V_S | V |
| Internal voltage FM-mode automatically selected | Pin 10 open | | | 2.3 | | |
| Control current | $V_{CTRL} < 5\text{ V}$ Pin 10 | I_{CTRL} | | | 200 | μA |
| FM-mode Test conditions: Picture carrier $f_{PC} = 38.9\text{ MHz}$, sound carrier $f_{SC1} = 33.4\text{ MHz}$, $f_{SC2} = 33.1587\text{ MHz}$, picture carrier to sound carriers ratio = 13/20 dB, picture carrier unmodulated (equivalent to sync peak pulse) | | | | | | |
| Sound carrier frequency range | | f_{SC} | 30 | | 40 | MHz |
| Picture carrier input voltage | Pin 5, 6 | v_{PC} | 10 | 20 | 30 | mV |
| Sound carrier minimal input voltage | 5.5 MHz intercarrier signal -3 dB Pin 1, 2 | v_{SC} | | 50 | | μV |
| Sound carrier gain control range | | AGC | 60 | 65 | | dB |
| Intercarrier output voltage | Pin 8 | v_{OIC} | | 350 | | mV |
| Output resistance | Pin 8 | R_O | | 15 | | Ω |
| Signal to noise ratio Test conditions: Sound carrier $V_{SC} = 10\text{ mV}$, picture carrier $v_{PC} = 20\text{ mV}$, limited carrier from TDA4453 or com- parable vision IF circuit, reference signal: frequency deviation $\Delta f = \pm 30\text{ kHz}$, sound modulation $f_{mod} = 1\text{ kHz}$. Weighted (S + N)/N ratio of the demodulated intercarrier signal in accordance with CCIR468-4, measured with FM-demodulator U2829B | | | | | | |
| Picture carrier unmodulated | Channel 1/2 | (S + N)/N | | 68/67 | | dB |
| Black picture | Channel 1/2 | (S + N)/N | | 62/60 | | dB |
| Grid | Channel 1/2 | (S + N)/N | | 50/48 | | dB |

| Parameters | Test Conditions / Pins | Symbol | Min. | Typ. | Max. | Unit |
|--|--|-----------|------|------|------|------------|
| AM-mode ; Test condition: sound carrier $f_{SC} = 32.4$ MHz | | | | | | |
| Sound carrier minimal input voltage | AF output voltage -3 dB Pin 1, 2 | v_{SC} | | 50 | | μ V |
| Sound carrier gain control range | | AGC | 60 | 65 | | dB |
| AF output voltage | $m = 54\%$, $f_{mod} = 1$ kHz Pin 12 | v_{AF} | | 500 | | mV |
| Total harmonic distortion | $m = 80\%$, $f_{mod} = 1$ kHz Pin 12 | THD | | 1.5 | 3.0 | % |
| Allowable external resistance | Pin 12 | R_{ext} | 3 | | | k Ω |
| Output resistance | Pin 12 | R_O | | 30 | | Ω |

Test Circuit

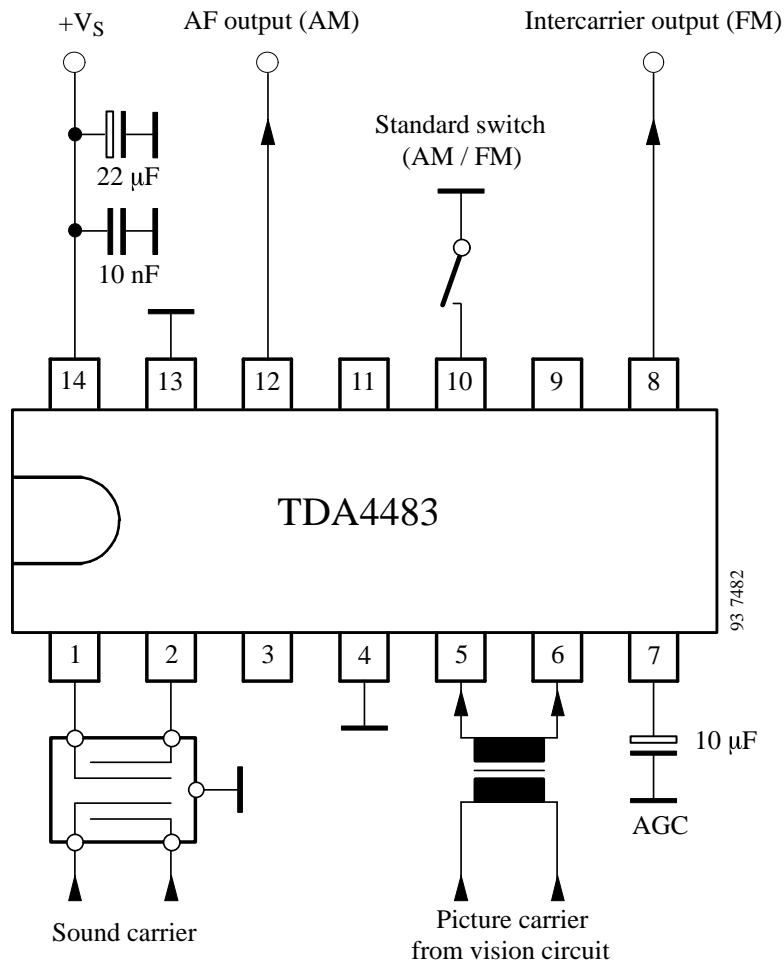
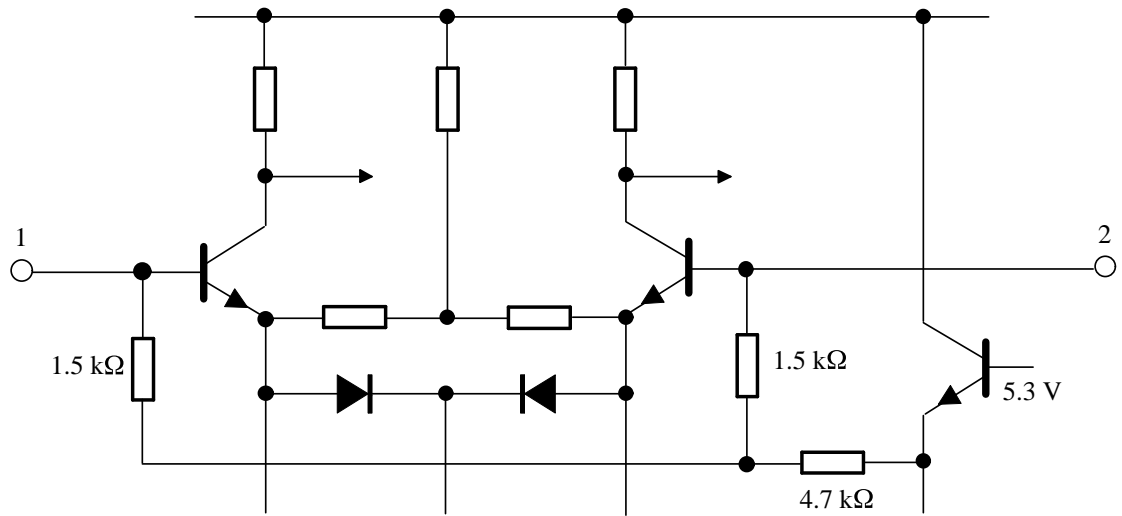


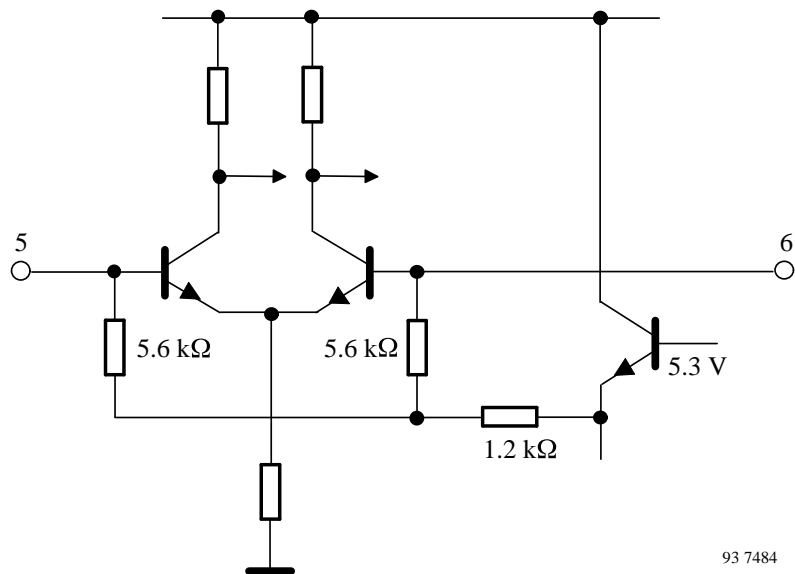
Figure 2.

Internal Pin Circuit Diagrams



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Figure 3. Pin 1, 2 - Sound carrier input



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Figure 4. Pin 5, 6 - Picture carrier input

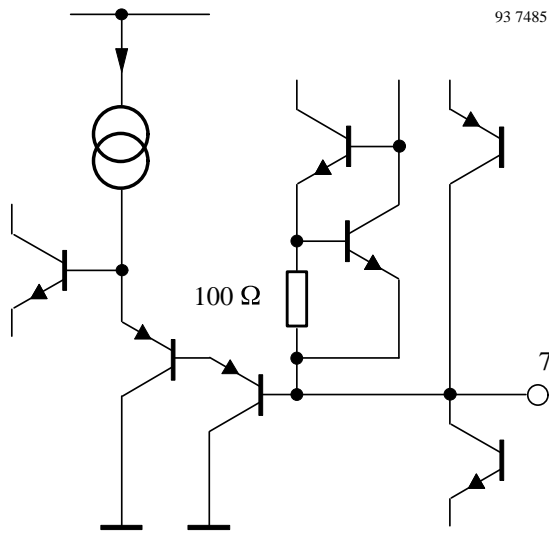


Figure 5. Pin 7 – AGC time constant

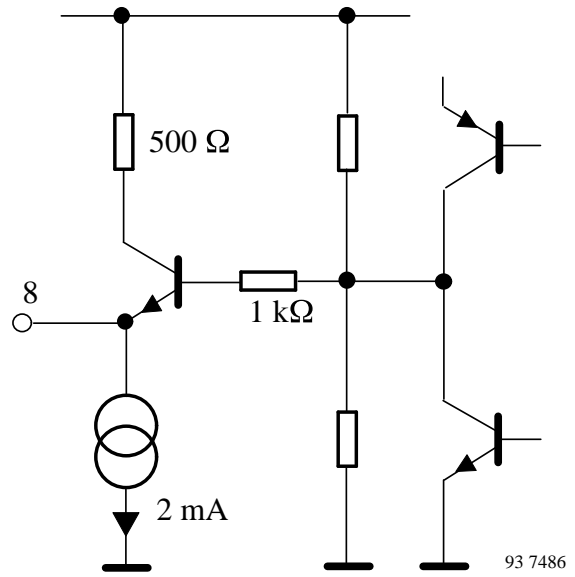


Figure 6. Pin 8 – Intercarrier output, FM-mode

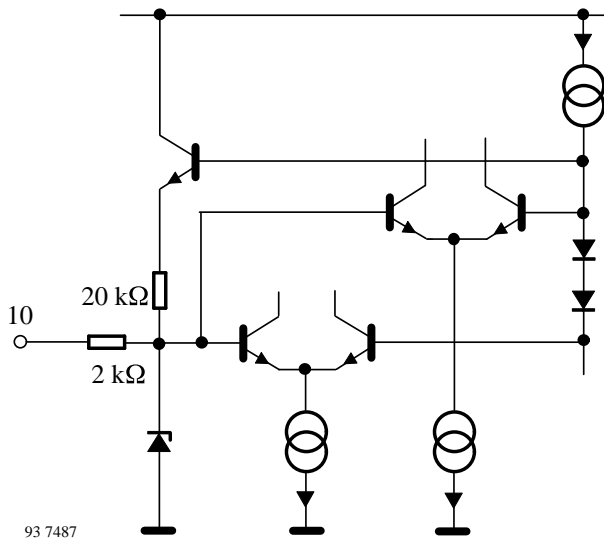
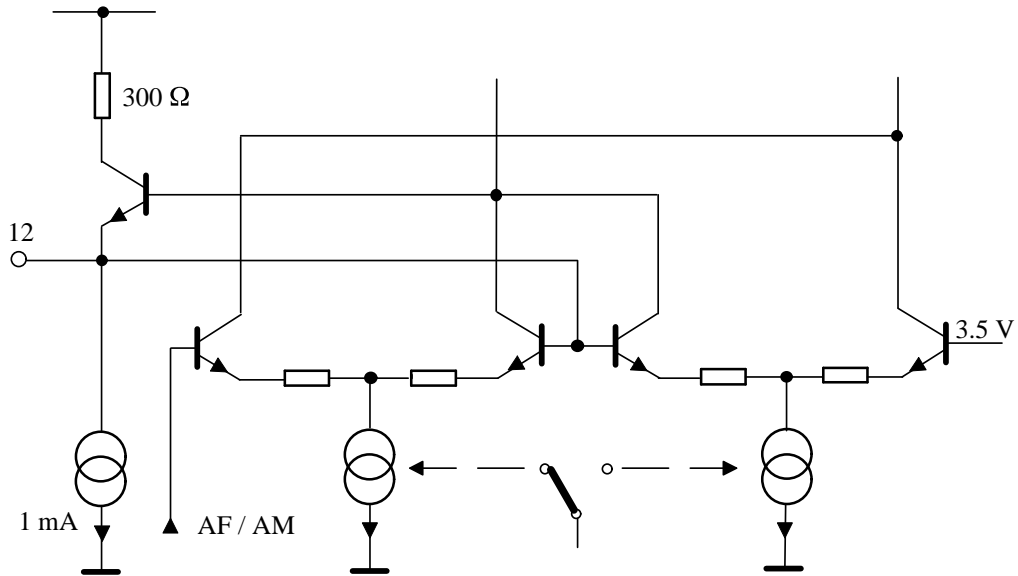


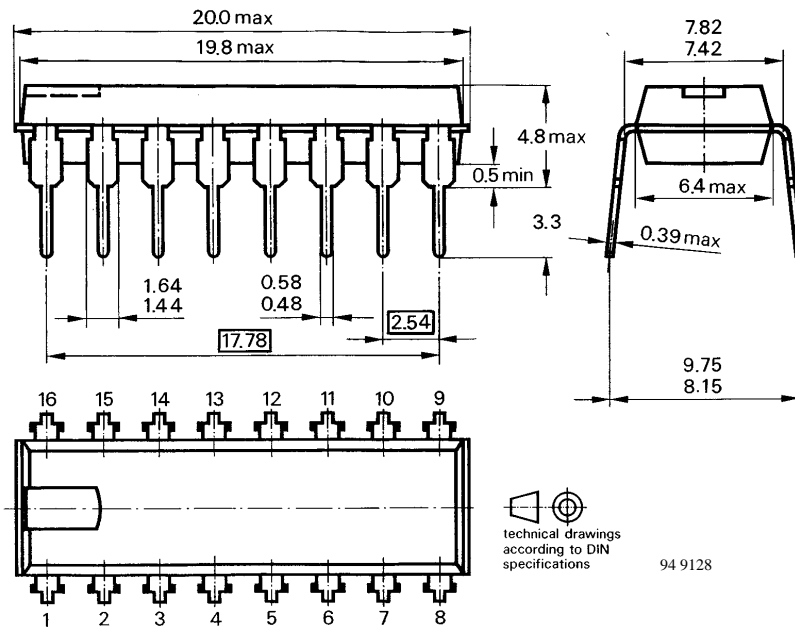
Figure 7. Pin 10 – Standard switch (AM or FM/NICAM)



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Figure 8. Pin 12 – AF output, AM mode

Dimensions in mm



Ozone Depleting Substances Policy Statement

It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

TEMIC can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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