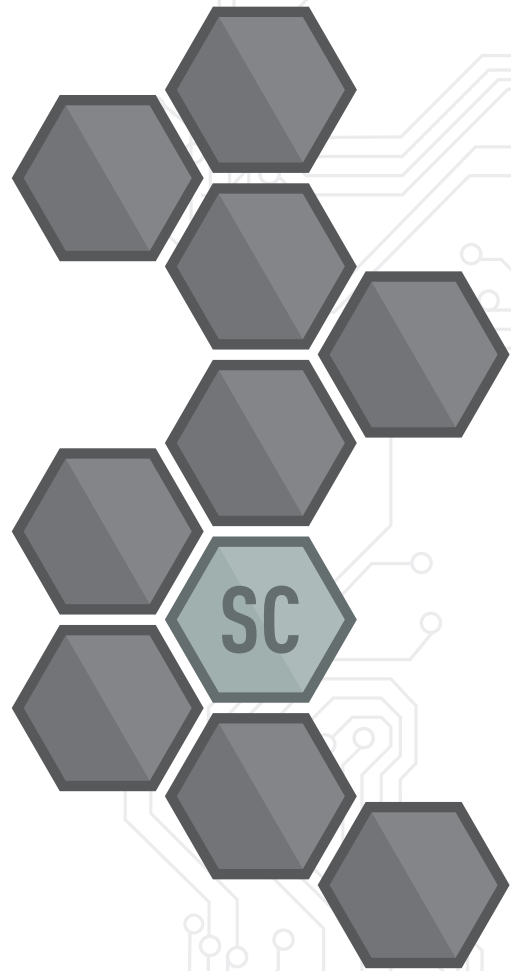


# Panasonic

## Semiconductors Line Card Catalog



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# SEMICONDUCTORS

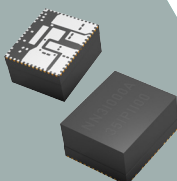
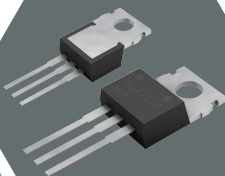
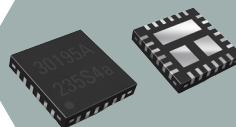
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Diodes

Transistors

MOSFETs

ASSP



|        | Type                   | Package       | Series | Absolute Maximum Rating |             | Electrical Characteristics |                            |              |                     |
|--------|------------------------|---------------|--------|-------------------------|-------------|----------------------------|----------------------------|--------------|---------------------|
| Diodes |                        |               |        | VR (V)                  | IF(AV) (mA) | IR max. (uA)               | trr max. (ns)              | VF max. (ns) | IF (mA)             |
|        | Switching Diode        | Surface Mount | DA/BA  | 40 - 300                | 100 - 200   | 0.1 - 1.0                  | 3.0 - 60                   | --           | --                  |
|        |                        |               |        | VR (V)                  | IF(AV) (mA) | IR max. (uA)               | trr max. (ns)              | VF max. (ns) | IF (mA)             |
|        | Schottky Barrier Diode | Surface Mount | DB     | 20 - 60                 | 30 - 5000   | 0.3 - 3150                 | --                         | 0.37 - 1.0   | 30 - 5000           |
|        | Type                   | Package       | Series | Absolute Maximum Rating |             |                            | Electrical Characteristics |              |                     |
|        |                        |               |        | VRRM (V)                | IF(AV) (A)  | IFSM max. (A)              | VF max. (V)                | IF (A)       | trr max. (ns)       |
|        | Fast Recovery Diode    | Surface Mount | DA**F  | 200 - 800               | 0.3 - 1     | 1 - 20                     | 0.98 - 4.0                 | 0.2 - 1.0    | 25 - 400 (typ.)     |
|        |                        |               |        |                         |             |                            |                            | VZ (V) nom.  | VZ (V) min. to max. |
|        | Zener Diode            | Surface Mount | DZ     | --                      |             |                            | --                         |              | 2.7 - 82            |

| Transistors                            | Type                                                   | Package       | Series | Polarity | Absolute Maximum Rating |            | Electrical Characteristics |           |            |          |
|----------------------------------------|--------------------------------------------------------|---------------|--------|----------|-------------------------|------------|----------------------------|-----------|------------|----------|
|                                        |                                                        |               |        |          | VCE0 (V)                | IC (mA)    | VCE (sat) max. (V)         | IC (mA)   | hFE        | IC (mA)  |
|                                        | Small Signal Transistor (Low-frequency Amplifiers)     | Surface Mount | DS     | PNP/NPN  | 10 - 100                | 20 - 5000  | 0.15 - 2.5                 | 10 - 3000 | 90 - 40000 | 1 - 2000 |
|                                        |                                                        |               |        |          | VCE0 (V)                | IC (mA)    | fT typ. (Hz)               | IC (mA)   | hFE        | IC (mA)  |
|                                        | Small Signal Transistor (High-frequency Amplifiers)    | Surface Mount | DS     | PNP-/NPN | 10 - 20                 | 15 - 50    | 300M - 1.66 (max.)         | 1 - 15    | 25 - 260   | 1 - 5    |
|                                        | Type                                                   | Package       | Series | Polarity | Absolute Maximum Rating |            | Electrical Characteristics |           |            |          |
|                                        |                                                        |               |        |          | VCE0 (V)                | IC (mA)    | hFE                        |           |            |          |
|                                        | Composite Transistor                                   | Surface Mount | DM     | PNP/NPN  | -50 - 100               | -500 - 500 | 65 - 1200                  |           |            |          |
|                                        |                                                        |               |        |          | VCE0 (V)                | IC (mA)    | Resistor Value (kΩ)        |           | hFE        |          |
|                                        |                                                        |               |        |          |                         |            | R1                         | R2        |            |          |
|                                        | Transistor with Built-in Resistors (Ic = 80mA Series)  | Surface Mount | DR     | PNP/NPN  | 50                      | 80         | 0.51 - 100                 | 2.2 - 100 | 6 - 460    |          |
|                                        |                                                        |               |        |          | VCE0 (V)                | IC (mA)    | Resistor Value (kΩ)        |           | hFE        |          |
|                                        |                                                        |               |        |          |                         |            | R1                         | R2        |            |          |
|                                        | Transistor with Built-in Resistors (Ic = 100mA Series) | Surface Mount | DR     | PNP/NPN  | 50                      | 100        | 0.51 - 100                 | 2.2 - 100 | 6 - 460    |          |
|                                        |                                                        |               |        |          | VCE0 (V)                | IC (mA)    | Resistor Value (kΩ)        |           | hFE        |          |
|                                        |                                                        |               |        |          |                         |            | R1                         | R2        |            |          |
|                                        | Transistor with Built-in Resistors (Ic = 200mA Series) | Surface Mount | DR     | PNP/NPN  | 30                      | 200        | 1 - 4.7                    | 4.7 - 47  | 115 - 140  |          |
|                                        |                                                        |               |        |          | VGDS (V)                | ID (mA)    | IDSS max. (mA)             |           |            |          |
| Junction FET (Low Frequency Amplifier) | Surface Mount                                          | DSK           | Nch    | 55       | 30                      | 6.5        |                            |           |            |          |

|                                         | Type                                    | Package       | Series    | Polarity  | Absolute Maximum Rating |            | Electrical Characteristics |               |            |                  |                   |                   |
|-----------------------------------------|-----------------------------------------|---------------|-----------|-----------|-------------------------|------------|----------------------------|---------------|------------|------------------|-------------------|-------------------|
| MOSFETs                                 |                                         |               |           |           | VDSS<br>(V)             | ID<br>(A)  | RDS (on) max. (Ω)          |               |            | tON typ.<br>(ns) | tOFF typ.<br>(ns) |                   |
|                                         |                                         |               |           |           |                         |            | VGS =<br>2.5V              | VGS =<br>4.0V |            |                  |                   |                   |
|                                         | MOS FETs                                | Surface Mount | FK3       | Pch       | 30                      | 0.1        | 17                         | 7             | 300        | 400              |                   |                   |
|                                         |                                         |               |           | Nch       | 30 - 60                 | 0.1        | 6 - 15                     | 3 - 12        | 100        | 100              |                   |                   |
|                                         | Composite MOS FETs<br>(Small Signal)    | Surface Mount | F**       | Nch x 2   | 30 - 60                 | 0.1        | 6 - 15                     | 3 - 12        | 100        | 100              |                   |                   |
|                                         |                                         |               |           | Pch + Nch | -30/30                  | -0.1/0.1   | 17/6                       | 7/3           | 100/100    | 100/100          |                   |                   |
|                                         | Type                                    | Package       | Series    | Polarity  | Absolute Maximum Rating |            | Electrical Characteristics |               |            |                  |                   |                   |
|                                         |                                         |               |           |           | VDSS<br>(V)             | ID<br>(A)  | RDS (on) max. (Ω)          |               |            | Ciss typ. (pF)   | tON typ.<br>(ns)  | tOFF typ.<br>(ns) |
|                                         |                                         |               |           |           |                         |            | VGS =<br>1.8V              | VGS =<br>2.5V | VGS = 4.0V |                  |                   |                   |
|                                         | MOSFETs<br>(Power Management)           | Surface Mount | MTM/EJ    | Pch       | 12                      | 4.0        | 54 - 75                    | 41 - 55       | 40 - 42    | 1200             | 30 - 50           | 300               |
|                                         | MOSFETs<br>(Power Management)           | Surface Mount | MTM/EJ    | Pch       | 20                      | 1.0 - 3.0  | 230/-                      | 70 - 560      | 55 - 420   | 80 - 3000        | 14 - 50           | 27 - 250          |
|                                         | MOSFETs<br>(Power Management)           | Surface Mount | MTM/FK    | Nch       | 20                      | 2.0 - 4.5  | 300/-                      | 28 - 150      | 28 - 110   | 280 - 1730       | 12 - 49           | 50 - 225          |
|                                         |                                         |               |           |           | VDSS<br>(V)             | ID<br>(A)  | RDS (on) max. (Ω)          |               |            | Ciss typ. (pF)   | tON typ.<br>(ns)  | tOFF typ.<br>(ns) |
|                                         |                                         |               |           |           |                         |            | VGS =<br>4.5V              | VGS =<br>5.0V | VGS = 10V  |                  |                   |                   |
|                                         | MOSFETs<br>(Power Management)           | Surface Mount | MTM       | Pch       | 40                      | 7.0        | 45                         | -             | 25         | 2700             | 33                | 300               |
|                                         | MOSFETs<br>(Power Management)           | Surface Mount | MTM / FK  | Nch       | 33 - 40                 | 6.5 - 14   | 13 - 35                    | -             | 4.6 - 25   | 360 - 1750       | 11 - 19           | 33 - 350          |
|                                         | Composite MOSFETs<br>(Power Management) | Surface Mount | FC        | Nch x 2   | 33                      | 5.0 - 6.5  | 35 - 68                    | -             | 20 - 40    | 210 - 360        | 10 - 11           | 24 - 33           |
|                                         |                                         |               |           |           | VDSS<br>(V)             | ID<br>(A)  | RDS (on) max. (Ω)          |               |            | Ciss typ. (pF)   | tON typ.<br>(ns)  | tOFF typ.<br>(ns) |
|                                         |                                         |               |           |           |                         |            | VGS =<br>1.8V              | VGS =<br>2.5V | VGS = 4.0V |                  |                   |                   |
|                                         | Composite MOSFETs<br>(Power Management) | Surface Mount | MTM       | Pch x 2   | -20 - -12               | -4.8 - -12 | 60 - 280                   | 40 - 200      | 42 - 130   | 440 - 1400       | 20 - 243          | 96 - 430          |
|                                         | Composite MOSFETs<br>(Power Management) | Surface Mount | MTM / FC  | Nch x 2   | 20 - 24                 | 2.0 - 8.0  | 300/-                      | 15 - 150      | 25 - 105   | 280 - 1450       | 13 - 1030         | 38 - 6000         |
| Composite MOSFETs<br>(Power Management) | Surface Mount                           | MTM / FG      | Pch + Nch | -20/20    | -1.2/1.9                | -          | 200/150                    | 130/105       | 440/280    | 35/12            | 100/50            |                   |
| Composite MOSFETs (Power<br>Management) | Surface Mount                           | MTM / FG      | Pch + Nch | -20/30    | -2.0/0.1                | 245/-      | 185/6000                   | 135/3000      | 300/12     | 14/100           | 112/100           |                   |

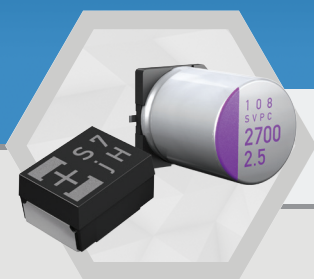
|         | Type                               | Package | Series        | Polarity | Absolute Maximum Rating |                       |                       |                       | Electrical Characteristics   |                           |                           |                               |                              |                               |                            |                        |                             |          |
|---------|------------------------------------|---------|---------------|----------|-------------------------|-----------------------|-----------------------|-----------------------|------------------------------|---------------------------|---------------------------|-------------------------------|------------------------------|-------------------------------|----------------------------|------------------------|-----------------------------|----------|
| MOSFETs |                                    |         |               |          | MOS FET                 |                       | SBD                   |                       | MOS FET                      |                           |                           |                               |                              |                               | SBD                        |                        |                             |          |
|         |                                    |         |               |          | V <sub>DS</sub><br>(V)  | I <sub>D</sub><br>(A) | V <sub>R</sub><br>(V) | I <sub>F</sub><br>(A) | R <sub>DS(on)</sub> max. (Ω) |                           |                           | C <sub>iss</sub> typ.<br>(pF) | t <sub>ON</sub> typ.<br>(ns) | t <sub>OFF</sub> typ.<br>(ns) | V <sub>F</sub> max.<br>(V) | I <sub>F</sub><br>(mA) | I <sub>R</sub> max.<br>(uA) |          |
|         |                                    |         |               |          |                         |                       |                       |                       | V <sub>GS</sub> =<br>1.8V    | V <sub>GS</sub> =<br>2.5V | V <sub>GS</sub> =<br>4.0V |                               |                              |                               |                            |                        |                             |          |
|         | MOSFET + SBD<br>(Power Management) |         | Surface Mount | FL       | Pch                     | -20                   | -1.0 -<br>2.1         | 15 - 20               | 0.5 -<br>0.8                 | 230/-                     | 170 -<br>560              | 120 -<br>420                  | 80 - 400                     | 6 - 35                        | 17 - 112                   | 0.47 -<br>0.55         | 500 -<br>800                | 10 - 200 |
|         | MOSFET + SBD<br>(Power Management) |         | Surface Mount | FM       | Nch                     | 20                    | 2.0 - 2.2             | 20                    | 0.8 -<br>1.0                 | -                         | 150                       | 105                           | 280                          | 13                            | 38                         | 0.47 -<br>0.52         | 800 -<br>1000               | 80       |

|      |                 | Type                                      | Package                                           | Series                | Operating Voltage (V)             | Output Voltage (V) | Functions                                                                                                                                                                                                                                                             |
|------|-----------------|-------------------------------------------|---------------------------------------------------|-----------------------|-----------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ASSP | DCDC Converters | High-Reliability DCDC with Integrated FET | SSOP024-P-0300F<br>HQFP048-P-0707B                | AN33xxx               | 5.0 - 39.0                        | 1.2 - 9.0          | <ul style="list-style-type: none"> <li>Settable Oscillation Frequency Range: 200 kHz - 2.0 MHz</li> <li>Various Built-in Protection Functions (UVLO, OVP, SOP, TSD)</li> </ul>                                                                                        |
|      |                 | Multi-Ch DCDC with Integrated FET&LDO     | UBGA009-W-1515AEA<br>HQFN024-P-0404<br>Others     | AN301xxx              | 2.5 - 5.5                         | 0.8 - 3.3          | <ul style="list-style-type: none"> <li>High-speed Response Due to Hysteretic Control</li> <li>Abundant Protection Functions (Protection Against Over-current, Short-circuit, UVLO, Overheating)</li> <li>On/Off Control Possible Using External Enable Pin</li> </ul> |
|      |                 | DCDC with FETs in a Package               | HQFN024-A3-0404A<br>HQFN040-A3-0606<br>Others     | NN30xxx               | 4.5 - 30.0                        | 0.6 - 5.5          | <ul style="list-style-type: none"> <li>High-speed Response Due to Hysteretic Control</li> <li>Various Built-in Protection Functions (OVP, OCP, SCP, TSD)</li> </ul>                                                                                                   |
|      | Hall Sensor ICs | Position Sensor ICs                       | SMINI-5DE                                         | AN488xx               | -                                 | -                  | <ul style="list-style-type: none"> <li>Low-power Consumption,</li> <li>High Sensitivity</li> <li>CMOS Hall IC COMOS Inverter</li> </ul>                                                                                                                               |
|      | Motor Drivers   | Stepping Motor Drivers                    | SSOP032-P-0300B<br>HSOP042-P-0400D<br>Others      | AN44xxx               | 10 - 34 (VM)                      | Peak Current       | <ul style="list-style-type: none"> <li>Built-in Thermal Protection Circuit</li> <li>Built in PWM Oscillator (Not in AN44071A)</li> </ul>                                                                                                                              |
|      |                 |                                           |                                                   |                       |                                   | 0.8A - 2.5A        |                                                                                                                                                                                                                                                                       |
|      |                 | Motor Drivers Special Functions           | QFN044-P-0606D                                    | AN41908               | 2.7 - 3.6 (Vcc)<br>3.0 - 5.5 (VM) | -                  | <ul style="list-style-type: none"> <li>4-channel H Bridge Driver (256 Micro Step)</li> <li>Three-line Bi-directional Serial Data Communication</li> <li>Built-in PWM Drive Iris Control</li> </ul>                                                                    |
|      |                 |                                           |                                                   | AN41919               | 3.1, 4.8                          | -                  | <ul style="list-style-type: none"> <li>DC Iris Control IC</li> </ul>                                                                                                                                                                                                  |
|      |                 | 3-Phase Brushless DC Motor Driver IC      | HQFN024-A-0404                                    | AN441xxA              | 12v/24v system                    | -                  | <ul style="list-style-type: none"> <li>Provide sine-wave PWM drive with one Hall sensor to reduce the component count, size, and noise of a motor module</li> </ul>                                                                                                   |
|      |                 | Brushed DC Motor Driver IC                | WLCSP<br>HSOP034-P-0300A                          | AN44xxxA/<br>AN41xxxA | 5v/24v system                     | -                  | <ul style="list-style-type: none"> <li>Panasonic brushed DC motor series consists of the single motor driver ICs and the dual motor driver ICs.</li> </ul>                                                                                                            |
|      | LED Driver      | Matrix LED Drivers                        | XBGA012-W-1316AEL<br>UBGA035-W-3333AEA<br>Others  | AN3xxxx               | 3.1 - 6.0                         | -                  | <ul style="list-style-type: none"> <li>LED Matrix Driver</li> </ul>                                                                                                                                                                                                   |
|      |                 | General Purpose LED Drivers               | SSOP016-P-0225E<br>QFN016-P-0304B                 | AN30888A/B            | 3.0 - 20.0                        | -                  | <ul style="list-style-type: none"> <li>High-brightness LED-drive Driver IC</li> <li>Reference Voltage (VREF) 30mV/200mV</li> <li>For Backlights, Camera Flashes, General Illumination</li> </ul>                                                                      |
|      | RF Amplifiers   | Low Noise Amplifiers                      | SSMINI-5DC<br>ALGA005-W-0609ANA                   | AN260xxx              | 1.65 - 3.6                        | -                  | <ul style="list-style-type: none"> <li>LNA for GPS (AN26014, AN26016)</li> <li>5 GHz-band LNA for WLAN (AN26025)</li> <li>Others</li> </ul>                                                                                                                           |
|      |                 | Power Amplifiers                          | ALGA011-W-0912ANB                                 | AN26102               | 2.95 - 4.2                        | -                  | <ul style="list-style-type: none"> <li>2.4 GHz-band PA for WLAN</li> </ul>                                                                                                                                                                                            |
|      | Logic LSI       | NFC Tag                                   | SSOP 16pins 5.0 x 6.4mm<br>QFN 16pins 3.2 x 4.2mm | MN63Y12xx             | 1.7 - 3.6                         | -                  | <ul style="list-style-type: none"> <li>RF interface compliant to ISO/IEC14443 TypeB, JISX6319-4</li> <li>NFC forum specification Type3 tag, Type4 tag</li> <li>Built in non volatile memory: 4k bit FeRAM</li> </ul>                                                  |

|      |                              | Type                  | Package                                                                      | Series       | Operating Voltage (V) | Output Voltage (V) | Functions                                                                                                                                                                                                                                                                                                                                                                                         |
|------|------------------------------|-----------------------|------------------------------------------------------------------------------|--------------|-----------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ASSP | MCU                          | Touch key control MCU | SSOP 32pins 11.0 x 8.1mm<br>LQFP 64pins 16.0 x 16.0mm                        | MN101EFA5-7  | -                     | -                  | <ul style="list-style-type: none"> <li>Panasonic original AM1 (MN101) 8-bit Single-chip Microcontroller</li> <li>Built-in capacitive touch key detection circuit selection of products with built in ROM/RAM from 32k/1k to 128k/6k</li> </ul>                                                                                                                                                    |
|      |                              | ReRAM MCU             | TQFP064-P-1010D 80pins 14.0 x 14.0mm<br>TQFP080-P-1212F 80pins 14.0 x 14.0mm | MN101LR04/05 | -                     | -                  | <ul style="list-style-type: none"> <li>8-bit low-power consumption microcomputer</li> <li>Delivers both smaller area and small ROM code size as 8-bit microcomputer and high performance as 16-bit microcomputer based on 16-bit microcomputer core with alterable (3 or 4) stage pipeline.</li> <li>It also delivers lower power consumption of the system by intermittent operation.</li> </ul> |
|      | Wireless Charging System ICs | Receiver              | XBGA048-W-3232AML                                                            | AN32258A     | 4.4 - 19              | 5                  | <ul style="list-style-type: none"> <li>Panasonic's wireless power solution uses a transmitter control IC (NN32251A) for power transmitter (battery charger) and a receiver control IC (AN32258A) for power receiver (equipment), controlling power transmission.</li> </ul>                                                                                                                       |
|      |                              | Transmitter           | HQFP64 Type                                                                  | NN32251A     | 4.6 - 19.5            | -                  | <ul style="list-style-type: none"> <li>The combination of NN32251A and AN32258A allows the extension of high-power transmission of up to 10 W from the WPC 1.1 (Qi standard)-compliant 5 W output.</li> </ul>                                                                                                                                                                                     |

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