

Product Scout Automotive

| Series | V _{GS} [V] | R _{DS(on)} [mΩ] | | I _{DM} [A] | P _{tot} @ T _c = 25°C [W] | R _{th(j-c)} [°C/W] | C _{iss} typ. [nC] | C _{iss} typ. [pF] | Package | Part Number |
|-----------|---------------------|--------------------------|------------------------|---------------------|--|-----------------------------|----------------------------|----------------------------|--------------|-------------|
| | | V _{GS} = 10.0V | V _{GS} = 4.5V | | | | | | | |
| N-Channel | 40 | 1.05 | - | 180 | 348 | 0.43 | 200 | 11500 | TO-263-7p | NP180N04TUK |
| | | 1.4 | - | 110 | 348 | 0.43 | 200 | 11500 | TO-263ZP | NP110N04PUK |
| | | 1.5 | - | 160 | 250 | 0.60 | 130 | 7400 | TO-263-7p | NP160N04TUK |
| | | 1.75 | - | 110 | 250 | 0.60 | 130 | 7400 | TO-263ZP | NP109N04PUK |
| | | 2.3 | - | 100 | 176 | 0.85 | 84 | 4700 | TO-263ZP | NP100N04PUK |
| | | 2.8 | - | 90 | 147 | 1.02 | 68 | 3800 | TO-252ZP | NP90N04VUK |
| | | 2.85 | - | 90 | 176 | 0.85 | 84 | 4700 | TO-220M | NP90N04MUK |
| | | 2.9 | - | 90 | 176 | 0.85 | 84 | 4700 | TO-262N | NP90N04NUK |
| | | 2.95 | - | 90 | 147 | 1.02 | 68 | 3800 | TO-263ZP | NP89N04PUK |
| | | 3.3 | - | 90 | 147 | 1.02 | 68 | 3800 | TO-220M | NP89N04MUK |
| | 3.3 | - | 90 | 147 | 1.02 | 68 | 3800 | TO-262N | NP89N04NUK | |
| | 3.3 | - | 75 | 138 | 1.09 | 61 | 3440 | HSN-8 | NP75N04YUK | |
| | 3.85 | - | 60 | 105 | 1.43 | 42 | 2350 | TO-252ZP | NP60N04VUK | |
| | 4.3 | - | 60 | 105 | 1.43 | 42 | 2350 | TO-220M | NP60N04MUK | |
| | 4.3 | - | 60 | 105 | 1.43 | 42 | 2350 | TO-262N | NP60N04NUK | |
| | 4.8 | - | 50 | 97 | 1.55 | 38 | 2160 | HSN-8 | NP50N04YUK | |
| | 1.4 | - | 180 | 348 | 0.43 | 200 | 11500 | TO-263-7p | NP180N055TUK | |
| | 1.75 | - | 110 | 348 | 0.43 | 200 | 11500 | TO-263ZP | NP110N055PUK | |
| | 2.1 | - | 160 | 250 | 0.60 | 130 | 7400 | TO-263-7p | NP160N055TUK | |
| | 2.2 | - | 110 | 250 | 0.60 | 130 | 7400 | TO-263ZP | NP109N055PUK | |
| | 3.25 | - | 100 | 176 | 0.85 | 84 | 4700 | TO-263ZP | NP100N055PUK | |
| | 3.8 | - | 90 | 176 | 0.85 | 84 | 4700 | TO-220M | NP90N055MUK | |
| | 3.8 | - | 90 | 176 | 0.85 | 84 | 4700 | TO-262N | NP90N055NUK | |
| | 3.85 | - | 90 | 147 | 1.02 | 68 | 3800 | TO-252ZP | NP90N055VUK | |
| | 4.0 | - | 90 | 147 | 1.02 | 68 | 3800 | TO-263ZP | NP89N055PUK | |
| | 4.4 | - | 90 | 147 | 1.02 | 68 | 3800 | TO-220M | NP89N055MUK | |
| | 4.4 | - | 90 | 147 | 1.02 | 68 | 3800 | TO-262N | NP89N055NUK | |
| | 4.5 | - | 75 | 138 | 1.09 | 61 | 3440 | HSN-8 | NP75N055YUK | |
| | 5.5 | - | 60 | 105 | 1.43 | 42 | 2350 | TO-252ZP | NP60N055VUK | |
| | 6.0 | - | 60 | 105 | 1.43 | 42 | 2350 | TO-220M | NP60N055MUK | |
| | 6.0 | - | 60 | 105 | 1.43 | 42 | 2350 | TO-262N | NP60N055NUK | |
| | 6.7 | - | 35 | 97 | 1.55 | 38 | 2160 | HSN-8 | NP35N055YUK | |
| | 1.5 | - | 180 | 288 | 0.43 | 150 | 9500 | TO-263-7p | NP180N04TUJ | |
| | 1.8 | - | 110 | 288 | 0.52 | 150 | 9500 | TO-263ZP | NP110N04PUJ | |
| | 2.0 | - | 160 | 220 | 0.60 | 115 | 6900 | TO-263-7p | NP160N04TUJ | |
| | 2.3 | - | 110 | 220 | 0.68 | 120 | 6900 | TO-263ZP | NP109N04PUJ | |
| | 3.0 | - | 100 | 227 | 0.66 | 107 | 5900 | TO-262N | NP100N04NUJ | |
| | 2.1 | - | 180 | 288 | 0.52 | 150 | 9500 | TO-263-7p | NP180N055TUJ | |
| | 2.4 | - | 110 | 288 | 0.52 | 150 | 9500 | TO-263ZP | NP110N055PUJ | |
| | 3.0 | - | 160 | 220 | 0.60 | 115 | 6900 | TO-263-7p | NP160N055TUJ | |
| | 3.2 | - | 110 | 220 | 0.68 | 120 | 6900 | TO-263ZP | NP109N055PUJ | |
| | 1.5 | - | 110 | 288 | 0.52 | 253 | 16400 | TO-263ZP | NP110N03PUG | |
| | 2.4 | - | 88 | 200 | 0.75 | 165 | 9000 | TO-263ZK | NP88N03KUG | |
| | 2.4 | 3.9 | 88 | 200 | 0.75 | 165 | 9000 | TO-263ZK | NP88N03KDG | |
| | 2.8 | - | 82 | 143 | 1.05 | 106 | 6050 | TO-263ZP | NP82N03PUG | |
| | 3.2 | 8.0 | 90 | 105 | 1.43 | 90 | 5000 | TO-252ZP | NP90N03VUG | |
| | 3.2 | - | 90 | 105 | 1.43 | 90 | 5000 | TO-252ZP | NP90N03VHG | |
| | 3.2 | - | 90 | 105 | 1.43 | 90 | 5000 | TO-252ZP | NP90N03VUG | |
| | 4.8 | - | 60 | 88 | 1.70 | 62 | 3500 | TO-263ZK | NP60N03KUG | |
| | 5.0 | - | 55 | 77 | 1.95 | 62 | 3500 | TO-252ZK | NP55N03SUG | |
| | 1.5 | - | 180 | 288 | 0.52 | 260 | 17100 | TO-263-7p | NP180N04TUG | |
| | 1.8 | - | 160 | 250 | 0.60 | 230 | 13500 | TO-263-7p | NP161N04TUG | |
| | 1.8 | 3.2 | 110 | 288 | 0.52 | 230 | 14500 | TO-263ZP | NP110N04PDG | |
| | 1.8 | - | 110 | 288 | 0.52 | 260 | 17100 | TO-263ZP | NP110N04PUG | |
| | 2.0 | 5.4 | 160 | 220 | 0.68 | 180 | 10500 | TO-263-7p | NP160N04TDG | |
| | 2.0 | - | 160 | 220 | 0.68 | 178 | 10500 | TO-263-7p | NP160N04TUG | |
| | 2.3 | - | 110 | 220 | 0.68 | 180 | 11500 | TO-263ZP | NP109N04PUG | |
| | 2.9 | - | 88 | 200 | 0.75 | 165 | 10000 | TO-263ZK | NP88N04KUG | |
| | 3.0 | - | 90 | 217 | 0.69 | 182 | 11200 | TO-220M | NP90N04MUG | |
| | 3.4 | - | 88 | 200 | 0.75 | 171 | 9510 | TO-262N | NP88N04NUG | |
| | 3.5 | 8.0 | 82 | 143 | 1.05 | 100 | 6000 | TO-263ZP | NP82N04PDG | |
| | 3.5 | - | 82 | 143 | 1.05 | 106 | 6500 | TO-263ZP | NP82N04PUG | |
| | 4.0 | 8.6 | 90 | 105 | 1.43 | 90 | 4900 | TO-252ZP | NP90N04VUG | |
| | 4.0 | 8.6 | 90 | 105 | 1.43 | 90 | 4900 | TO-252ZP | NP90N04VDG | |
| | 4.0 | - | 90 | 105 | 1.43 | 90 | 5000 | TO-252ZP | NP90N04VUG | |
| | 4.2 | - | 82 | 143 | 1.05 | 106 | 6500 | TO-220M | NP82N04MUG | |
| | 4.2 | - | 82 | 143 | 1.05 | 106 | 6500 | TO-262N | NP82N04NUG | |
| | 4.2 | 8.5 | 82 | 143 | 1.05 | 100 | 6000 | TO-220M | NP82N04MLG | |
| | 4.2 | 8.5 | 82 | 143 | 1.05 | 100 | 6000 | TO-262N | NP82N04NLG | |
| | 4.2 | 8.5 | 82 | 143 | 1.05 | 100 | 6000 | TO-220M | NP82N04MDG | |
| | 4.2 | 8.5 | 82 | 143 | 1.05 | 100 | 6000 | TO-262N | NP82N04NDG | |
| | 4.5 | 8.7 | 80 | 115 | 1.30 | 90 | 4900 | TO-263ZP | NP80N04PLG | |
| | 4.5 | - | 80 | 115 | 1.30 | 90 | 4900 | TO-263ZP | NP80N04PUG | |
| | 4.5 | 8.7 | 80 | 115 | 1.30 | 90 | 4900 | TO-263ZP | NP80N04PDG | |
| | 4.8 | - | 80 | 115 | 1.30 | 90 | 4900 | TO-262N | NP80N04NUG | |
| | 4.8 | 9.0 | 80 | 115 | 1.30 | 90 | 4900 | TO-220M | NP80N04MLG | |
| | 4.8 | 9.0 | 80 | 115 | 1.30 | 90 | 4900 | TO-262N | NP80N04NLG | |
| | 4.8 | 9.0 | 80 | 115 | 1.30 | 90 | 4900 | TO-220M | NP80N04MDG | |
| | 4.8 | 9.0 | 80 | 115 | 1.30 | 90 | 4900 | TO-262N | NP80N04NDG | |
| | 5.0 | - | 70 | 115 | 1.30 | 90 | 4900 | TO-220M | NP70N04MUG | |
| | 4.8 | - | 75 | 138 | 1.09 | 77 | 4300 | HSN-8 | NP75N04YUG | |
| | 5.5 | - | 75 | 120 | 1.25 | 64 | 3620 | HSN-8 | NP74N04YUG | |
| | 6.1 | - | 60 | 88 | 1.71 | 63 | 3400 | TO-263ZK | NP60N04KUG | |
| | 6.3 | - | 60 | 88 | 1.70 | 60 | 3200 | TO-220M | NP60N04MUG | |
| | 6.5 | - | 55 | 77 | 1.95 | 63 | 3400 | TO-252ZK | NP55N04SUG | |
| | 6.5 | 15.0 | 55 | 77 | 1.95 | 57 | 2700 | TO-252ZK | NP55N04SLG | |
| | 9.7 | 15.0 | 35 | 77 | 1.95 | 36 | 1900 | HSN-8 | NP35N04YUG | |
| | 10.0 | - | 35 | 77 | 1.95 | 34 | 1900 | HSN-8 | NP35N04YUG | |
| | 25.0 | - | 16 | 36 | 4.20 | 7 | 315 | HSN-8 | NP16N04YUG | |
| | 2.4 | - | 110 | 288 | 0.52 | 251 | 17100 | TO-263ZP | NP110N055PUG | |
| | 3.9 | - | 88 | 200 | 0.75 | 166 | 9600 | TO-263ZK | NP88N055KUG | |
| | 5.2 | - | 82 | 143 | 1.05 | 106 | 6400 | TO-263ZP | NP82N055PUG | |
| | 6.0 | 10.5 | 90 | 105 | 1.43 | 93 | 4900 | TO-252ZP | NP90N055VDG | |
| | 6.0 | - | 90 | 105 | 1.43 | 90 | 5000 | TO-252ZP | NP90N055VUG | |
| | 6.0 | - | 82 | 143 | 1.05 | 105 | 6400 | TO-220M | NP82N055MUG | |
| | 6.0 | - | 82 | 143 | 1.05 | 105 | 6400 | TO-262N | NP82N055NUG | |
| | 6.6 | 10.9 | 80 | 115 | 1.30 | 90 | 4600 | TO-263ZP | NP80N055PDG | |
| | 6.9 | 11.2 | 80 | 115 | 1.30 | 90 | 4600 | TO-220M | NP80N055MDG | |
| | 6.9 | 11.2 | 80 | 115 | 1.30 | 93 | 4900 | TO-262N | NP80N055NDG | |
| | 9.4 | - | 60 | 88 | 1.70 | 61 | 3700 | TO-263ZK | NP60N055KUG | |
| 9.5 | 12.0 | 55 | 77 | 1.95 | 64 | 3200 | TO-252ZK | NP55N055SDG | | |
| 10.0 | - | 55 | 77 | 1.95 | 60 | 3500 | TO-252ZK | NP55N055SUG | | |
| 14.0 | - | 52 | 56 | 2.68 | 38 | 2100 | TO-252ZK | NP52N055SUG | | |
| 6.7 | 8.5 | 82 | 143 | 1.05 | 106 | 5700 | TO-263ZP | NP82N06PLG | | |
| 6.7 | 8.5 | 82 | 143 | 1.05 | 106 | 5700 | TO-263ZP | NP82N06PDG | | |
| 7.4 | 9.7 | 82 | 143 | 1.05 | 106 | 5700 | TO-220M | NP82N06MLG | | |
| 7.4 | 9.7 | 82 | 143 | 1.05 | 106 | 5700 | TO-262N | NP82N06NLG | | |
| 7.8 | 12.5 | 90 | 105 | 1.43 | 95 | 5000 | TO-252ZP | NP90N06VUG | | |
| 8.3 | 13.0 | 80 | 115 | 1.30 | 85 | 4600 | TO-263ZP | NP80N06PLG | | |
| 8.6 | 13.3 | 80 | 115 | 1.30 | 85 | 4600 | TO-220M | NP80N06MLG | | |
| 8.6 | 13.3 | 80 | 115 | 1.30 | 85 | 4600 | TO-262N | NP80N06NLG | | |
| 14.0 | 20.0* | 33 | 97 | 1.55 | 52 | 2600 | HSN-8 | NP33N06YDG | | |
| 17.5 | 25.0 | 52 | 56 | 2.68 | 39 | 2100 | TO-252ZK | NP52N06SLG | | |
| 27.0 | 37.0* | 23 | 60 | 2.50 | 27 | 1200 | HSN-8 | NP23N06YDG | | |
| 28.0 | 32.0 | 33 | 88 | 1.70 | 30 | 1500 | HSN-8 | NP33N06YDF | | |
| 15.0 | - | 82 | 150 | 1.00 | 64 | 2900 | TO-263ZP | NP82N10PUG | | |
| 20.0 | - | 70 | 120 | 1.25 | 50 | 2500 | TO-263ZP | NP70N10KUG | | |
| 25.0 | 36.0 | 40 | 120 | 1.25 | 47 | 2100 | HSN-8 | NP40N10YDF | | |
| 26.0 | 37.0 | 40 | 120 | 1.25 | 47 | 2100 | TO-252ZP | NP40N10VDF | | |
| 27.0 | 38.0 | 40 | 120 | 1.25 | 47 | 2100 | TO-263ZP | NP40N10PDF | | |
| 55.0 | 68.0* | 20 | 73 | 2.06 | 23 | 1100 | HSN-8 | NP20N10YDF | | |
| 7.0 | 11.0 | 80 | 120 | 1.25 | 48 | 2600 | TO-263ZK | NP80N03KLE | | |
| 7.0 | 11.0 | 80 | 120 | 1.25 | 48 | 2600 | TO-263ZK | NP80N03KDE | | |
| 7.0 | 11.0 | 80 | 120 | 1.25 | 48 | 2600 | TO-220M | NP80N03MLE | | |
| 7.0 | 11.0 | 80 | 120 | 1.25 | 48 | | | | | |

Automotive Body Solutions

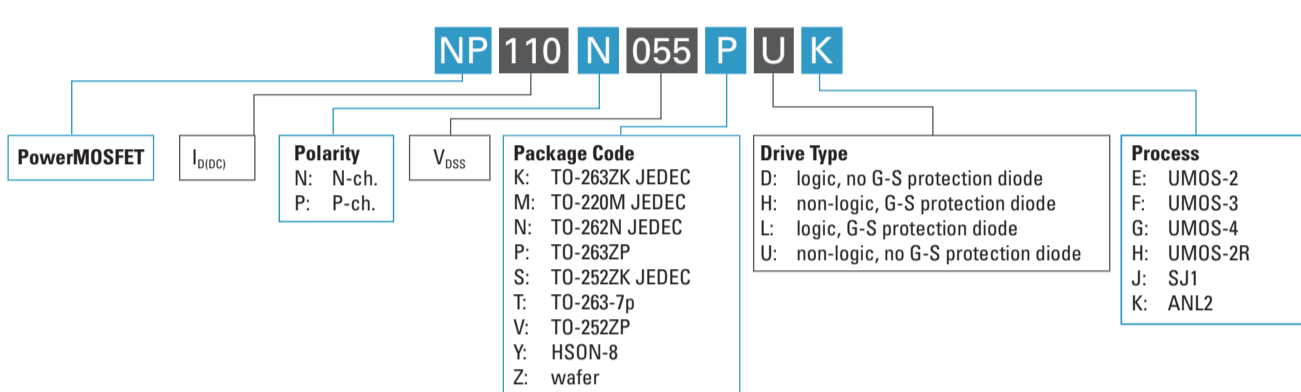
- High-side drivers designed for car lighting, fitting all types of grounded load
- Overcurrent and overtemperature protected

| Product Name | Package | Channels | Channel Type | Supply Voltage [V] | $R_{DS(on)}$ [mΩ] | Current Sense | Sense Ratio typ. | Diagnostic | Overtemperature Protection | Overcurrent Protection | Control |
|-----------------|-------------|----------|--------------|--------------------|-------------------|---------------|------------------|------------|----------------------------|------------------------------------|-------------------------|
| 1st Generation | | | | | | | | | | | |
| UPD166009 | TO-252-5p | 1 | N | 6.0 - 18.0 | 10 | ✓ | 10000 | ✓ | autorestart | latch | current |
| UPD166010 | TO-252-5p | | | | | | | | | | |
| UPD166020 | TO-252-5p | | | | | | | | | | |
| UPD166021 | TO-252-5p | | | | | | | | | | |
| UPD166017 | TO-252-5p | | | | | | | | | | |
| UPD166019 | TO-252-5p | P | | | 19 | - | n/a | | autorestart | | voltage (12.0 V) |
| 2nd Generation: | | | | | | | | | | | |
| NHS010A | TO-252-7p | 1 | N | 4.5 - 28.0 | 10 | ✓ | 5000 | ✓ | autorestart | latch and current/power limitation | voltage (3.3 V - 5.0 V) |
| NHS012A | TO-252-7p | | | | 12 | | | | | | |
| NHS012B | MO-226B-12p | | | | 16 | | | | | | |
| NHD012C | HSSOP-24 | | | | 2 | | | | | | |
| NHS016B | MO-226B-12p | | | | 1 | | | | | | |
| NHD016C | HSSOP-24 | | | | 2 | | | | | | |
| NHS025B | MO-226B-12p | | | | 1 | | | | | | |
| NHD025B | MO-226B-12p | | | | 2 | | | | | | |
| NHS050D | MO-272-12p | | | | 1 | | | | | | |
| NHD050B | MO-226B-12p | | | | 2 | | | | | | |
| NHQ050C | HSSOP-24 | 4 | | | 50 | | 3400 | | | | |
| NHS090D | MO-272-12p | 1 | | | 90 | | 1400 | | | | |
| NHD090B | MO-226B-12p | 2 | | | | | | | | | |
| NHD090D | MO-272-12p | 2 | | | | | | | | | |
| NHQ090C | HSSOP-24 | 4 | | | | | | | | | |

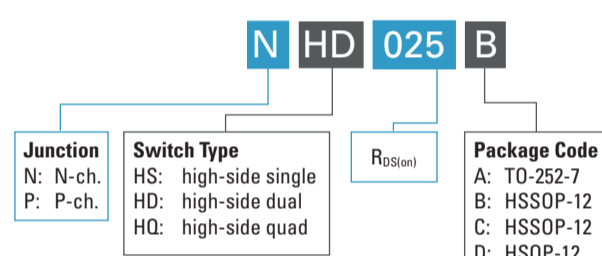
Notes:
 All devices are qualified according to AEC-Q100 and AEC-Q100-012 flow.
 All devices are RoHS compliant.

General Information

Part numbering system for NP-Series PowerMOSFETs



Part numbering system of 2nd generation Intelligent Power Devices



Package Drawings

| | | |
|------------------------|-------------------------|---------------------------|
| <p>TO-220M</p> | <p>TO-252-5p</p> | <p>TO-252ZK</p> |
| <p>TO-252ZP</p> | <p>TO-262N</p> | <p>TO-263-7p</p> |
| <p>TO-263ZK</p> | <p>TO-263ZP</p> | <p>MO-226B-12p</p> |
| <p>HSON-8</p> | <p>HSSOP-24</p> | |

Automotive Microcontrollers

Edition March 2012

Table with columns: Series, Nickname/Group, Part number, Flash size [M], RAM [K], Data flash [K], Core, CPU, I/O lines, CS/JART (MHz), CAN, I2C, External bus, Other interfaces, Timer channels, PWMs, Clock speed, Internal oscillator(s), Subclock, A/D converter/D/A converter, Supply voltage, Pin, Packages, T_amb [C], Other features.

Other features: BUR Backup RAM, DRO Direct RAM Output, LCD LCD controller/driver, POC Power-On Clear, SRC Sample Rate Converter, CMP Comparator, DTS Data transfer controller, LTR LTR LIN Transceiver, RTC Real-Time Clock, SMC Stepper motor controller, DIV Battery Voltage Supervisor, GPT 2D/3D graphics engine, LVI Low-voltage indicator, WDT Window Watchdog Timer, DMA Direct memory access, GFS GFS baseband controller, MCT Motor control timer, SMD System protection function, DRI Direct RAM input access, IFS Image renderer, MCT Motor control timer, SMD System protection function, XIP Execute in Place from serial flash

Table with columns: Series, Nickname/Group, Part number, Flash size [B], RAM [B], Data flash [B], Core, FPU, I/O lines, CS/JART (LIN), CAN, IEC, External bus, Other interfaces, Timer channels, PWMs, Clock speed [MHz], Internal oscillator(s), Subclock [kHz], A/D converter/D/A converter, Supply voltage [V] (VDD), Pins, Packages, Tjmax [°C], Other features.

Legend for abbreviations: BUR (Backup RAM), BV5 (Battery Voltage Supervisor), CMP (Comparator), DIV (Hardware divider), DMA (Direct memory access), DRI (Direct RAM Input), DRD (Direct RAM Output), DTC (Data transfer controller), ENC (Encoder timer for rotary switch), GFX (2D/3D graphics engine), GPS (GPS baseband controller), IMR (Image renderer), LBI (LCD bus interface), LTR (LIN Transceiver), LVI (Low-voltage indicator), MCT (Motor control timer), MUL (Hardware multiplier), POC (Power-On Clear), RIF (Resolver interface), RTC (Real-Time Clock), SMC (Stepper motor controller), SNG (Sound generator), SRC (Sample Rate Converter), VR3 (Voltage Regulator 3.3V), VR5 (Voltage Regulator 5.0V), WDT (Window Watchdog Timer), XIP (Execute in Place from serial flash).

Tools

Software Tools section including IAR Embedded Workbench (78K, R8C, RL78, V850 & SH), Green Hills Multi (V850 & SH), Renesas C/C++ Compiler Package (SH), AUTOSAR, Renesas Graphics Library (RGL), and Applinet.

On-Chip Debugging

On-Chip Debugging tools: E1 On-Chip Debugger (78K, R8C, RL78, V850), E10A-USB On-Chip Debugger (SH), Exchange Adapter for On-Chip Debugger.

In-Circuit Emulation

In-Circuit Emulation tools: IEUCBE2 In-Circuit Emulator (V850E2 only), IEUCBE In-Circuit Emulator (78K, RL78, V850), E100 In-Circuit Emulator (R8C).

3rd Party Emulators

3rd Party Emulators: iSYSTEM, Lauterbach.

Flash Programmers

Flash Programmers: Flash Programmer PG-FP5, Renesas Flash Programming Software (RFP) for Microsoft Windows™, Flash Development Toolkit (FDT) for Microsoft Windows™.

Starter Kits

Starter Kits: V850E2/Fx4-L Starter Kit, V850E2/Px4 Starter Kit, Motor Control Application Board 1.

Evaluation Boards

Evaluation Boards: RL78/F12 Target Board, R8C3x Application Board, 78K0R/Fx3 Target Board, V850E2/Fx4 Application Board, SH72546 Evaluation Board, SH745x Development Board, V850E2/Dx4 Application Board, V850E2/Dx4-3D Application Board, V850E2/Dx4 Add-On QVGA Board, V850E2/PJ4 Application Board, SH7269 Development Board, SH726B Development Board.

R-CAR M1A Development Board 'MILAN'

R-CAR M1A Development Board 'MILAN' and R-CAR H1 Development Board 'MARZEN' details.

R-CAR H1 Development Board 'MARZEN'

R-CAR H1 Development Board 'MARZEN' details.

Package Dimensions

Table with columns: Pincount, Code, Plating, Type, Body Size [mm²], Pin Pitch [mm].

Renesas Europe Homepage



www.renesas.eu

Online technical community



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3rd Party network



www.renesas.eu/alliance

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Online technical training



www.renesasinteractive.com

Twitter news feed



www.twitter.com/renesas_europe

Before purchasing or using any Renesas Electronics products listed herein, please refer to the latest product manual and/or data sheet in advance.

