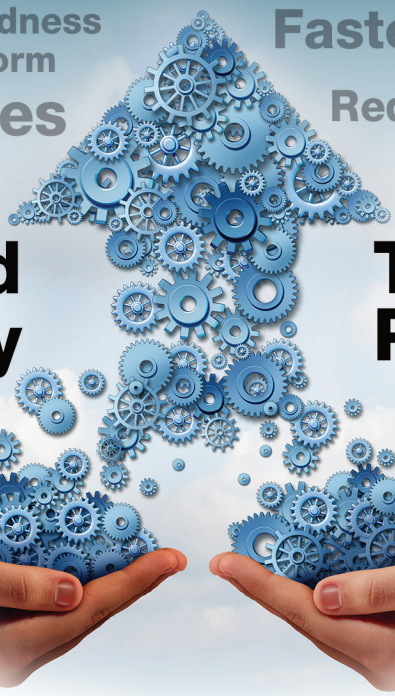
# 3 V to 16 V Enhanced Analog Switches and Multiplexers



Enhanced Ruggedness
Proven Process Platform
Long Life Cycles
Higher ESD Capability
High-Density Process
Rugged Reliability
Established Factories
Reduced Lead Times
Increased Voltage up to 16 V
High Latch-Up Current

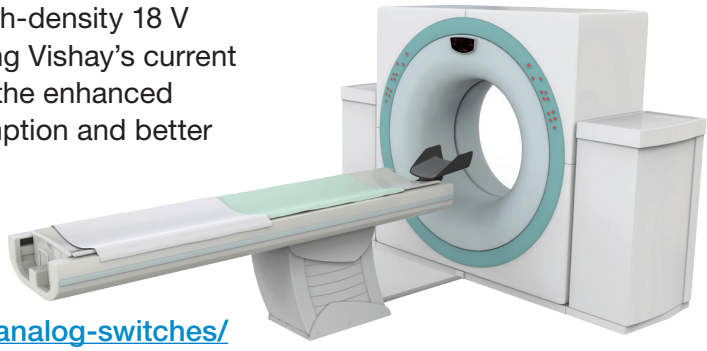
Faster Switching Speeds
Reduced Power Consumption
Reduced Parasitic Capacitance
Technology Performance
Lower Switch On-Resistance
Low Leakage

Vishay Siliconix, inventor of the analog switch, continues to develop new products and drive innovation with a new line of enhanced analog switches and multiplexers.

## APPLICATIONS:

- Test equipment and data acquisition
- Audio and video signal routing
- Industrial process control and automation
- Medical and healthcare equipment
- Communication systems

The new enhanced products, designed on a proven high-density 18 V BCD process, offer an upgrade path for customers using Vishay's current 12 V series products. Through improved performance, the enhanced family addresses requirements for lower power consumption and better precision in sensitive analog designs.



**For more information, please visit:** www.vishay.com/analog-switches/

**Contact:** analogswitchtechsupport@vishay.com

# DG408LE, DG409LE
## Enhanced Performance Products

### Enhanced Performance

- Extended operation to 16 V single power supply and ± 8 V dual power supplies
- Lower switch on-resistance with improved tolerance
- Reduced switch leakage limits by 50 %
- Enhanced ESD / HBM from 2 kV to 2.5 kV
- Enhanced latch-up capability from 200 mA to 300 mA

### Applications

- Automatic test equipment
- Data acquisition systems
- Meters and instruments
- Medical and healthcare systems
- Portable Meter

### New Products are Pin-Compatible with Current DG408L, DG409L Series:

| PACKAGE | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|---|
| TSSOP16 | DG408LDQ-E3 | DG408LEDQ-GE3 |
| | DG408LDQ-T1-E3 | DG408LEDQ-T1-GE3 |
| SOIC16 | DG408LDY-E3 | DG408LEDY-GE3 |
| | DG408LDY-T1-E3 | DG408LEDY-T1-GE3 |
| QFN16 | | DG408LEDN-T1-GE4 |

| EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|
| DG409LDQ-E3 | DG409LEDQ-GE3 |
| DG409LDQ-T1-E3 | DG409LEDQ-T1-GE3 |
| DG409LDY-E3 | DG409LEDY-GE3 |
| DG409LDY-T1-E3 | DG409LEDY-T1-GE3 |
| | DG409LEDN-T1-GE4 |

### Specification Comparison Table (Single 12 V):

| PARAMETER | TEMP | DG408L, DG409L | | | DG408LE, DG409LE | | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | TYP | MIN | MAX | TYP | MIN | MAX | |
| **Analog Switch** | | | | | | | | |
| Drain-Source On-Resistance | Room | 17 | | 29 | | | 23 | Ω |
| | Full | | | 35 | | | 27 | |
| On-Resistance Flatness | Room | 3 | | 7 | | | 6.5 | Ω |
| Switch Off Leakage Current $I_{S(off)}$ | Room | | -1 | 1 | | | | nA |
| | Full | | -10 | 10 | | -5 | 5 | |
| Switch Off Leakage Current $I_{D(off)}$ | Room | | -1 | 1 | | | | nA |
| | Full | | -10 | 10 | | -5 | 5 | |
| Channel On Leakage Current $I_{D(on)}$ | Room | | -1 | 1 | | | | nA |
| | Full | | -10 | 10 | | -5 | 5 | |
| **Dynamic Characteristics** | | | | | | | | |
| Transition Time | Room | 30 | | 60 | 85 | | 100 | ns |
| | Full | | | 65 | | | 110 | |
| Break-Before-Make Time | Room | 11 | 1 | | 34 | | | ns |
| | Full | | | | | | | |
| Enable Turn-On Time | Room | 38 | | 55 | 55 | | 72 | ns |
| | Full | | | 60 | | | 82 | |
| Enable Turn-Off Time | Room | 18 | | 25 | 36 | | 47 | ns |
| | Full | | | 30 | | | 50 | |
| Charge Injection (DG408L) | Full | 1 | | 5 | -11 | | - | pC |
| Charge Injection (DG409L) | Full | | | | -10 | | | |
| Off Isolation (DG408L) | Full | -70 | | | -99 | | | dB |
| Off Isolation (DG409L) | Full | | | | -87 | | | |
| Crosstalk (DG408L) | Full | -82 | | | -98 | | | dB |
| Crosstalk (DG409L) | Full | | | | -109 | | | |
| Source Off Capacitance (DG408L) | Full | | | | 5.5 | | | pF |
| Source Off Capacitance (DG409L) | Full | 7 | | | 5.5 | | | |
| Drain Off Capacitance (DG408L) | Full | | | | 25 | | | pF |
| Drain Off Capacitance (DG409L) | Full | 20 | | | 13.5 | | | |
| Drain On Capacitance (DG408L) | Full | | | | 35 | | | pF |
| Drain On Capacitance (DG409L) | Full | 31 | | | 23.5 | | | |
| **Power Supplies** | | | | | | | | |
| Power Supply Range | Full | | 3 | 12 | | | | V |
| Power Supply Current | Room | 0.2 | | 0.7 | 3.5 | | 6 | µA |

# DG411LE, DG412LE, DG413LE
## Enhanced Performance Products

### Enhanced Performance

- Extended operation to 16 V single power supply and ± 8 V dual power supplies from current 12 V and ± 6 V, respectively
- Enhanced ESD / HBM from 2 kV to 2.5 kV
- Enhanced latch-up capability from 200 mA to 400 mA

### Applications

- Automatic test equipment
- Data acquisition systems
- Meters and instruments
- Medical and healthcare systems
- Communication systems
- Portable Meters

### New products are pin-compatible with current DG411L, DG412L, DG413L series:

| PACKAGE | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|---|---|---|---|---|
| PDIP16 | DG411LDJ-E3 | DG411LEDJ-GE3 | DG412LDJ-E3 | DG412LEDJ-T1-GE3 | DG413LDJ-E3 | DG413LEDJ-GE3 |
| TSSOP16 | DG411LDQ-E3 | DG411LEDQ-GE3 | DG412LDQ-E3 | DG412LEDQ-GE3 | DG413LDQ-E3 | DG413LEDQ-GE3 |
| TSSOP16 | DG411LDQ-T1-E3 | DG411LEDQ-T1-GE3 | DG412LDQ-T1-E3 | DG412LEDQ-T1-GE3 | DG413LDQ-T1-E3 | DG413LEDQ-T1-GE3 |
| SOIC16 | DG411LDY-E3 | DG411LEDY-GE3 | DG412LDY-E3 | DG412LEDY-GE3 | DG413LDY-E3 | DG413LEDY-GE3 |
| SOIC16 | DG411LDY-T1-E3 | DG411LEDY-T1-GE3 | DG412LDY-T1-E3 | DG412LEDY-T1-GE3 | DG413LDY-T1-E3 | DG413LEDY-T1-GE3 |

### Specification Comparison Table (Single 12 V):

| Parameter | TEMP | DG411L, DG412L, DG413L | | | | DG411LE, DG412LE, DG413LE | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | TYP | MIN | MAX | UNIT | TYP | MIN | MAX | UNIT |
| **Analog Switch** | | | | | | | | | |
| **Analog Signal Range** | Full | | 0 | 12 | V | | 0 | 12 | V |
| **Drain-Source On-Resistance** | Room | 20 | | 30 | Ω | 16 | | 30 | Ω |
| | -40 °C to 85 °C | | | 40 | | | | 40 | |
| | -55 °C to 125 °C | | | 45 | | | | 45 | |
| **Dynamic Characteristics** | | | | | | | | | |
| **Turn-On Time** | Room | 20 | | 50 | ns | 16 | | 50 | ns |
| | -40 °C to 85 °C | | | 60 | | | | 60 | |
| | -55 °C to 12 5°C | | | 70 | | | | 70 | |
| **Turn-Off Time** | Room | 12 | | 30 | ns | 9 | | 30 | ns |
| | -40 °C to 85 °C | | | 40 | | | | 40 | |
| | -55 °C to 125 °C | | | 48 | | | | 48 | |
| **Break-Before-Make Time Delay** | Room | 6 | | | ns | 5 | | | ns |
| | -40 °C to 85 °C | | | | | | | | |
| | -55 °C to 125 °C | | | | | | | | |
| **Charge Injection** | Room | 5 | | | pC | 6.6 | | | pC |
| **Off Isolation** | Room | 71 | | | dB | 68.4 | | | dB |
| **Crosstalk** | Room | 95 | | | dB | 114 | | | dB |
| **Source Off Capacitance** | Room | 5 | | | pF | 5 | | | pF |
| **Drain Off Capacitance** | Room | 6 | | | pF | 6 | | | pF |
| **Drain On Capacitance** | Room | 15 | | | pF | 15 | | | pF |

# DG441LE, DG442LE

## Enhanced Performance Products

### Enhanced Performance

- Extended operation to 16 V single power supply and ± 8 V dual power supplies
- Lower switch on-resistance with improved tolerance
- Reduced switch leakage limits by 50 %
- Enhanced ESD / HBM from 2 kV to 2.5 kV
- Enhanced latch-up from 200 mA to 400 mA

### Applications

- Automatic test equipment
- Process control and automation
- Data acquisition systems
- Meters and instruments
- Medical and healthcare systems
- Communication systems

| PACKAGE | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|---|
| PDIP16 | DG441LDJ-E3 | DG441LEDJ-GE3 |
| TSSOP16 | DG441LDQ-E3 | DG441LEDQ-GE3 |
| | DG441LDQ-T1-E3 | DG441LEDQ-T1-GE3 |
| SOIC16 | DG441LDY-E3 | DG441LEDY-GE3 |
| | DG441LDY-T1-E3 | DG441LEDY-T1-GE3 |

| EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|
| DG442LDJ-E3 | DG442LEDJ-GE3 |
| DG442LDQ-E3 | DG442LEDQ-GE3 |
| DG442LDQ-T1-E3 | DG442LEDQ-T1-GE3 |
| DG442LDY-E3 | DG442LEDY-GE3 |
| DG442LDY-T1-E3 | DG442LEDY-T1-GE3 |

### Specification Comparison Table (Single 12 V):

| PARAMETER | TEMP | DG441L, DG442L | | | DG441LE, DG442LE | | | UNIT |
|---|---|---|---|---|---|---|---|---|
| | | TYP | MIN | MAX | TYP | MIN | MAX | |
| **Analog Switch** | | | | | | | | |
| Analog Signal Range | Full | | 0 | 12 | | 0 | 12 | V |
| Drain-Source On-Resistance | Room | 20 | | 30 | 16 | | 30 | Ω |
| | -40 °C to 85 °C | | | 40 | | | 40 | |
| | -55 °C to 125 °C | | | 45 | | | 45 | |
| On-Resistance Match bet. Channels | Room | 0.1 | | 0.5 | 0.1 | | 0.5 | Ω |
| Switch Off Leakage Current $I_{S(off)}$ | Room | | -1 | 1 | | -1 | 1 | nA |
| | -40 °C to 85 °C | | -10 | 10 | | -10 | 10 | |
| | -55 °C to 125 °C | | -15 | 15 | | -15 | 15 | |
| Switch Off Leakage Current $I_{D(off)}$ | Room | | -1 | 1 | | -1 | 1 | nA |
| | -40 °C to 85 °C | | -10 | 10 | | -10 | 10 | |
| | -55 °C to 125 °C | | -15 | 15 | | -15 | 15 | |
| Channel On Leakage Current $I_{D(on)}$ | Room | | -1 | 1 | | -1 | 1 | nA |
| | -40 °C to 85 °C | | -10 | 10 | | -10 | 10 | |
| | -55 °C to 125 °C | | -15 | 15 | | -15 | 15 | |
| **Digital Control** | | | | | | | | |
| Input Current, $V_{IN}$ Low | Room | 0.01 | | | 0.01 | | | µA |
| | -40 °C to 85 °C | | -1 | 1 | | -1 | 1 | |
| | -55 °C to 125 °C | | -1.5 | 1.5 | | -1.5 | 1.5 | |
| Input Current, $V_{IN}$ High | Room | | | | | | | µA |
| | -40 °C to 85 °C | | -1 | 1 | | -1 | 1 | |
| | -55 °C to 125 °C | | -1.5 | 1.5 | | -1.5 | 1.5 | |
| **Dynamic Characteristics** | | | | | | | | |
| Turn-On Time | Room | 20 | | 60 | 18 | | 60 | ns |
| | -40 °C to 85 °C | | | 70 | | | 70 | |
| | -55 °C to 125 °C | | | 80 | | | 80 | |
| Turn-Off Time | Room | 12 | | 35 | 18 | | 35 | ns |
| | -40 °C to 85 °C | | | 45 | | | 45 | |
| | -55 °C to 125 °C | | | 50 | | | 50 | |
| Charge Injection | Room | 5 | | | 6.6 | | | pC |
| Off Isolation | Room | 71 | | | 68.4 | | | dB |
| Crosstalk | Room | 95 | | | 114 | | | dB |
| Source Off Capacitance | Room | 5 | | | | | | pF |
| Drain Off Capacitance | Room | 6 | | | | | | pF |
| Drain On Capacitance | Room | 15 | | | | | | pF |
| **Power Supplies** | | | | | | | | |
| Positive Supply Current | Room | 0.03 | | | 0.03 | | | µA |
| | -40 °C to 85 °C | | | 1 | | | 1 | |
| | -55 °C to 125 °C | | | 1.5 | | | 1.5 | |
| Negative Supply Current | Room | 0.002 | -1 | | 0.002 | -1 | | µA |
| | -40 °C to 85 °C | | -5 | | | -5 | | |
| | -55 °C to 125 °C | | -7.5 | | | -7.5 | | |
| Ground Current | Room | 0.002 | | | 0.002 | | | µA |
| | -40 °C to 85 °C | | -1 | | | -1 | | |
| | -55 °C to 125 °C | | -1.5 | | | -1.5 | | |

# DG4051E, DG4052E, DG4053E
## Enhanced Performance Products

### Enhanced Performance

- Extended operation to 16 V single power supply and ± 8 V dual power supplies
- Lower switch on-resistance with improved tolerance
- Reduced switch leakage limits by 50 %
- Enhanced ESD / HBM from 2 kV to 2.5 kV
- Enhanced latch-up from 200 to 400 mA

### Applications

- Automatic test equipment
- Process control and automation
- Data acquisition systems
- Meters and instruments
- Medical and healthcare systems
- Communication systems
- Battery powered systems
- Audio and video signal routing

### New products are pin-compatible with current DG4051A, DG4052A and DG4053A series:

| PACKAGE | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|---|---|---|---|---|
| miniQFN16 | DG4051AEN-T1-E4 | DG4051EEN-T1-GE4 | DG4052AEN-T1-E4 | DG4052EEN-T1-GE4 | DG4053AEN-T1-E4 | DG4053EEN-T1-GE4 |
| TSSOP16 | DG4051AEQ-T1-E3 | DG4051EEQ-T1-GE3 | DG4052AEQ-T1-E3 | DG4052EEQ-T1-GE3 | DG4053AEQ-T1-E3 | DG4053EEQ-T1-GE3 |
| SOIC16 | | DG4051EEY-T1-GE3 | | DG4052EEY-T1-GE3 | | DG4053EEY-T1-GE3 |

### Specification Comparison Table (Dual ± 5 V):

| Parameter | Temperature °C | DG4051A, DG4052A, DG4053A | | | DG4051E, DG4052E, DG4053E | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Typ | Min | Max | Typ | Min | Max | |
| **Analog Switch** | | | | | | | | |
| Analog Signal Range | Full | | -5 | 5 | | -5 | 5 | V |
| Drain-Source On-Resistance | Room | 66 | | 100 | 68 | | 78 | Ω |
| | (-40 to +85) | | | 118 | | | 97 | Ω |
| | (-40 to +125) | | | 125 | | | 106 | Ω |
| $R_{DS(on)}$ Matching Between Channels | Room | 3 | | 6 | 0.91 | | 6 | Ω |
| | (-40 to +85) | | | 8 | | | 6 | Ω |
| | (-40 to +125) | | | 10 | | | 6 | Ω |
| On-Resistance Flatness | Room | 12 | | 16 | 10 | | 17 | Ω |
| | (-40 to +85) | | | 18 | | | 19 | Ω |
| | (-40 to +125) | | | 20 | | | 20 | Ω |
| Switch Off Leakage Current $I_{S(off)}$ | Room | ± 0.02 | -1 | 1 | ± 0.05 | -1 | 1 | nA |
| | (-40 to +85) | | -5 | 5 | | -5 | 5 | nA |
| | (-40 to +125) | | -50 | 50 | | -50 | 50 | nA |
| Switch Off Leakage Current $I_{D(off)}$ | Room | ± 0.02 | -1 | 1 | ± 0.05 | -1 | 1 | nA |
| | (-40 to +85) | | -5 | 5 | | -5 | 5 | nA |
| | (-40 to +125) | | -50 | 50 | | -50 | 50 | nA |
| Channel On Leakage Current $I_{D(on)}$ | Room | ± 0.02 | -1 | 1 | ± 0.05 | -1 | 1 | nA |
| | (-40 to +85) | | -5 | 5 | | -5 | 5 | nA |
| | (-40 to +125) | | -50 | 50 | | -50 | 50 | nA |
| **Digital Control** | | | | | | | | |
| Logic Low Input Voltage | Full | | | 0.8 | | | 0.6 | V |
| Logic High Input Voltage | Full | | 2.0 | | | 2.0 | | V |
| Input Current $I_L$ | Full | 0.01 | -1 | 1 | 0.02 | -1 | 1 | uA |
| Input Current $I_H$ | Full | 0.01 | -1 | 1 | 0.02 | -1 | 1 | uA |
| Dynamic Characteristics | | | | | | | | |
| Transition Time | Room | 36 | | 110 | 72 | | 130 | ns |
| | (-40 to +85) | | | 117 | 91 | | 150 | ns |
| | (-40 to +125) | | | 127 | 99 | | 160 | ns |
| Enable Turn-On Time | Room | 31 | | 108 | 35 | | 75 | ns |
| | (-40 to +85) | | | 114 | | | 80 | ns |
| | (-40 to +125) | | | 119 | | | 86 | ns |
| Enable Turn-Off Time | Room | 29 | | 92 | 48 | | 88 | ns |
| | (-40 to +85) | | | 98 | | | 95 | ns |
| | (-40 to +125) | | | 103 | | | 97 | ns |

## Specification Comparison Table (Dual +/- 5 V): (Continued):

| Parameter | Full | DG4051A, DG4052A, DG4053A | | | DG4051E, DG4052E, DG4053E | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Typ | Min | Max | Typ | Min | Max | |
| Break-Before-Make Time | Room | | 1 | | 23 | 1 | | ns |
| | (-40 to 85) | | | 98 | 41 | 1 | | ns |
| | (-40 to 125) | | 1 | | 53 | 13 | | ns |
| Charge Injection (worst of all parts) | Room | 0.25 | | | 0.38 | | | pC |
| BW | Room | 330 | | | 308 | | | MHz |
| | Room | 450 | | | 353 | | | |
| | Room | 730 | | | 930 | | | |
| Off Isolation DG4051E | Room | < -90 | | | < -90 | -108 | -108 | dB |
| | Room | | | | -68 | -59 | -68 | |
| | Room | | | | -49 | -38 | -47 | |
| Crosstalk DG4051E | Room | < -90 | | | < -90 | -95 | -93 | dB |
| | Room | | | | -62 | -63 | -60 | |
| | Room | | | | -51 | -45 | -41 | |
| Source Off Capacitance DG4051E | Room | 3 | | | 2.2 | | | pF |
| | Room | 3 | | | 2.1 | | | pF |
| | Room | 3 | | | 2 | | | pF |
| Drain Off Capacitance | Room | 12 | | | 9.2 | | | pF |
| | Room | 7 | | | 4.8 | | | pF |
| | Room | 4 | | | 3.1 | | | pF |
| Drain On Capacitance | Room | 17 | | | 14.9 | | | pF |
| | Room | 13 | | | 10.0 | | | pF |
| | Room | 11 | | | 8.5 | | | pF |
| Total Harmonic Distortion | Room | 0.28 | | | 0.065 | | | % |
| | Room | 0.28 | | | 0.065 | | | % |
| | Room | 0.28 | | | 0.065 | | | % |
| **Power Supplies** | | | | | | | | |
| Power Supply Range | Room | | -5 | 5 | | -5 | 5 | V |
| Power Supply Current I+ | Room | 0.05 | | 1 | 0.05 | | 1 | uA |
| | (-40 to 85) | | | 10 | | | 10 | uA |
| | (-40 to 125) | | | 10 | | | 10 | uA |
| Power Supply Current I- | Room | -0.05 | -1 | | -0.05 | -1 | | uA |
| | (-40 to 85) | | -10 | | | -10 | | uA |
| | (-40 to 125) | | -10 | | | -10 | | uA |
| Ground Current Ignd | Room | -0.05 | -1 | | -0.05 | -1 | | uA |
| | (-40 to 85) | | -10 | | | -10 | | uA |
| | (-40 to 125) | | -10 | | | -10 | | uA |
| Logic Supply Current IL | Room | 0.05 | | 1 | 0.05 | | 1 | uA |
| | (-40 to 85) | | | 10 | | | 10 | uA |
| | (-40 to 125) | | | 10 | | | 10 | uA |

# DG9408E, DG9409E
## Enhanced Performance Products

### Enhanced Performance

- Extended operation to 16 V single power supply and ± 8 V dual power supplies
- Reduced charge injection from 29 pF to 4.5 pF
- Parasitic on-capacitance reduced by 35 %
- Enhanced ESD / HBM from 2 kV to 2.5 kV
- Enhanced latch-up capability from 200 mA to 400 mA

### Applications

- Automatic test equipment
- Data acquisition systems
- Meters and instruments
- Medical and healthcare systems
- Communication systems
- Audio and video signal routing
- Portable Meters

### New products are pin-compatible with current DG9408, DG9409 series:

| PACKAGE | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|---|---|---|
| QFN16 | DG9408DN-T1-E4 | DG9408EDN-T1-GE4 | DG9409DN-T1-E4 | DG9409EDN-T1-GE4 |

### Specification Comparison Table (Single 12 V):

| Parameter | Temperature °C | DG9408, DG9409 | | | DG9408E, DG9409E | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Typ | Min | Max | Typ | Min | Max | |
| **Analog Switch** | | | | | | | | |
| Analog Signal Range | -40 to +85 | | 0 | 12 | | 0 | 12 | V |
| Drain-Source On-Resistance | Room | 4 | | 7 | 3.2 | | 7 | Ω |
| | -40 to +85 | | | 7.5 | | | 7.5 | |
| $R_{DS(on)}$ Matching Between Channels | Room | | | 3.6 | | | 3.6 | Ω |
| On-Resistance Flatness | Room | | | 8 | | | 8 | Ω |
| Switch Off Leakage Current $I_{S(off)}$ | Room | | -2 | 2 | | -2 | 2 | nA |
| | -40 to +85 | | -15 | 15 | | -15 | 15 | |
| Switch Off Leakage Current $I_{D(off)}$ | Room | | -2 | 2 | | -2 | 2 | nA |
| | -40 to +85 | | -15 | 15 | | -15 | 15 | |
| Channel On Leakage Current $I_{D(on)}$ | Room | | -2 | 2 | | -2 | 2 | nA |
| | -40 to +85 | | -15 | 15 | | -15 | 15 | |
| **Digital Control** | | | | | | | | |
| Logic High Input Voltage | -40 to +85 | | 2.4 | | | 2.4 | | V |
| Logic Low Input Voltage | -40 to +85 | | | 0.8 | | | 0.8 | V |
| Input Current | -40 to +85 | | -1 | 1 | | -1 | 1 | uA |
| **Dynamic Characteristics** | | | | | | | | |
| Transition Time | Room | 42 | | 71 | 40 | | 71 | ns |
| | -40 to +85 | | | 75 | | | 75 | |
| Break-Before-Make Time | Room | 24 | 2 | | 20 | 2 | | ns |
| | -40 to +85 | | | | | | | |
| Enable Turn-On Time | Room | 42 | | 70 | 36 | | 70 | ns |
| | -40 to +85 | | | 75 | | | 75 | |
| Enable Turn-Off Time | Room | 24 | | 44 | 24 | | 44 | ns |
| | -40 to +85 | | | 46 | | | 46 | |
| Charge Injection | Room | 29 | | | 4.5 | | | pC |
| Off Isolation | Room | -80 | | | -83 | | | dB |
| Crosstalk | Room | -85 | | | -89 | | | dB |
| Source Off Capacitance (DG9408) | Room | 21 | | | 17 | | | pF |
| Source Off Capacitance (DG9409) | Room | 23 | | | 16 | | | |
| Drain Off Capacitance (DG9408) | Room | 211 | | | 134 | | | pF |
| Drain Off Capacitance (DG9409) | Room | 112 | | | 67 | | | |
| Drain On Capacitance (DG9408) | Room | 238 | | | 154 | | | pF |
| Drain On Capacitance (DG9409) | Room | 137 | | | 86 | | | |
| **Power Supplies** | | | | | | | | |
| I+ Supply Current | Room | | | 1 | | | 1 | uA |
| I- Supply current | Room | | -1 | | | -1 | | uA |
| **ESD/Latch-Up** | | | | | | | | |
| ESD-HBM | Room | 2 | | | 2.5 | | | kV |
| ESD-MM | Room | | | | 100 | | | V |
| Latch-Up I-injection | Room | 200 | | | 400 | | | mA |

# DG9424E, DG9425E, DG9426E
## Enhanced Performance Products

### Enhanced Performance

- Extended operation to 16 V single power supply and ± 8 V dual power supplies
- Switch resistance reduced by 5 %
- Parasitic capacitance reduced by 25 %
- Enhanced ESD / HBM from 1 kV to 1.5 kV

### Applications

- Automatic test equipment
- Data acquisition systems
- Meters and instruments
- Medical and healthcare systems
- Computer peripherals
- Audio and video signal routing

### New products are pin-compatible with current DG9424, DG9425 and DG9426 series:

| PACKAGE | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|---|---|---|---|---|
| TSSOP16 | DG9424DQ-T1-E3 | DG9424EDQ-T1-GE3 | DG9425DQ-T1-E3 | DG9425EDQ-T1-GE3 | DG9426DQ-T1-E3 | DG9426EDQ-T1-GE3 |

### Specification Comparison Table (Dual +12 V / 0 V and $V_L$ = 5 V):

| Parameter | Temperature °C | DG9424, DG9425, DG9426 | | | DG9424E, DG9425E, DG9426E | | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | Typ | Min | Max | Typ | Min | Max | |
| Analog Switch | | | | | | | | |
| Analog Signal Range | Full | | 0 | 12 | | 0 | 12 | V |
| Drain-Source On-Resistance | Room | 1.8 | | 3 | 1.6 | | 3 | Ω |
| | (-40 to +85) | | | 4 | | | 4 | Ω |
| Switch Off Leakage Current $I_{S(off)}$ | Room | - | - | - | - | - | - | nA |
| | (-40 to +85) | - | - | - | - | - | - | nA |
| Switch Off Leakage Current $I_{D(off)}$ | Room | - | - | - | - | - | - | nA |
| | (-40 to +85) | - | - | - | - | - | - | nA |
| Channel On Leakage Current $I_{D(on)}$ | Room | - | - | - | - | - | - | nA |
| | (-40 to +85) | - | - | - | - | - | - | nA |
| Digital Control | | | | | | | | |
| Logic Low Input Voltage | Full | | | 0.8 | | | 0.8 | V |
| Logic High Input Voltage | Full | | 2.4 | | | 2.4 | | V |
| Input Current $I_L$ | Full | 0.01 | -1 | 1 | 0.01 | -1 | 1 | uA |
| Input Current $I_H$ | Full | 0.01 | -1 | 1 | 0.01 | -1 | 1 | uA |
| Dynamic Characteristics | | | | | | | | |
| Enable Turn-On Time | Room | 42 | | 57 | 36 | | 51 | ns |
| | (-40 to +85) | | | 65 | | | 65 | ns |
| Enable Turn-Off Time | Room | 28 | | 42 | 20 | | 35 | ns |
| | (-40 to +85) | | | 44 | | | 44 | ns |
| Break-Before-Make Time | Room | 2 | | | 2 | | | ns |
| | | | | | | | | |
| Charge Injection | Room | 38 | | | -29.2 | | | pC |
| Off Isolation | Room | -56 | | | -56 | | | dB |
| Crosstalk | Room | -77 | | | -96 | | | dB |
| Source Off Capacitance | Room | 49 | | | 30 | | | pF |
| Drain Off Capacitance | Room | 37 | | | 28 | | | pF |
| Drain On Capacitance | Room | 89 | | | 74 | | | pF |
| Power Supplies | | | | | | | | |
| Power Supply Current I+ | Room | 0.02 | | 1 | 0.02 | | 1 | uA |
| | (-40 to +85) | | | 5 | | | 5 | uA |
| Power Supply Current I- | Room | -0.002 | -1 | | -0.002 | -1 | | uA |
| | (-40 to +85) | | -5 | | | -5 | | uA |
| Logic Supply Current $I_L$ | Room | 0.002 | | 1 | 0.002 | | 1 | uA |
| | (-40 to +85) | | | 5 | | | 5 | uA |
| Ground Current $I_{GND}$ | Room | -0.002 | -1 | | -0.002 | -1 | | uA |
| | (-40 to +85) | | -5 | | | -5 | | uA |

# DG9454E
## Enhanced Performance Products

### Enhanced Performance

- Extended operation to 16 V single power supply and ± 8 V dual power supplies
- 40 % faster turn-on time
- Enhanced ESD / HBM from 2 kV to 2.5 kV

### Applications

- Games and goggles
- Process control and automation
- Data acquisition systems
- Meters and instruments
- Medical and healthcare systems
- Communication systems
- Battery powered systems

### New products are pin-compatible with current DG9454:

| PACKAGE | EXISTING PART NUMBER | NEW ENHANCED PART NUMBER |
|---|---|---|
| QFN16 | DG9454EN-T1-E4 | DG9454EEN-T1-GE4 |

### Specification Comparison Table (Single 12 V):

| PARAMETER | TEMP (°C) | DG9454 | | | DG9454E | | | |
|---|---|---|---|---|---|---|---|---|
| | | TYP | MIN | MAX | TYP | MIN | MAX | |
| **Analog Switch** | | | | | | | | |
| Analog Signal Range | Full | | 0 | 12 | | 0 | 12 | V |
| Drain-Source On-Resistance | Room | 80 | | 120 | 85 | | 103 | Ω |
| | (-40 to 85) | | | 137 | | | 125 | Ω |
| | (-40 to 125) | | | 143 | | | 133 | Ω |
| $R_{DS(on)}$ Matching Between Channels | Room | 4 | | 7 | 1.24 | | 8 | Ω |
| | (-40 to 85) | | | 8 | | | 8 | Ω |
| | (-40 to 125) | | | 10 | | | 8 | Ω |
| On-Resistance Flatness | Room | 32 | | 26 | 27 | | 37 | Ω |
| | (-40 to 85) | | | 28 | | | 43 | Ω |
| | (-40 to 125) | | | 30 | | | 44 | Ω |
| Switch Off Leakage Current $I_{s(off)}$ | Room | | -1 | 1 | | -1 | 1 | nA |
| | (-40 to 85) | | -5 | 5 | | -5 | 5 | nA |
| | (-40 to 125) | | -50 | 50 | | -50 | 50 | nA |
| Switch Off Leakage Current $I_{d(off)}$ | Room | | -1 | 1 | | -1 | 1 | nA |
| | (-40 to 85) | | -5 | 5 | | -5 | 5 | nA |
| | (-40 to 125) | | -50 | 50 | | -50 | 50 | nA |
| Channel On Leakage Current $I_{d(on)}$ | )Room | | -1 | 1 | | -1 | 1 | nA |
| | (-40 to 85) | | -5 | 5 | | -5 | 5 | nA |
| | (-40 to 125) | | -50 | 50 | | -50 | 50 | nA |
| **Digital Control** | | | | | | | | |
| Logic Low Input Voltage ($V_L$ = 2.7 V) | Full | | | 0.5 | | | 0.5 | V |
| Logic High Input Voltage ($V_L$ = 2.7 V) | Full | | 1.6 | | | 1.8 | | V |
| Input Current $I_L$ | Full | 0.01 | -1 | 1 | 0.02 | -1 | 1 | µA |
| Input Current $I_H$ | Full | 0.01 | -1 | 1 | 0.02 | -1 | 1 | µA |
| **Dynamic Characteristics** | | | | | | | | |
| Transition Time | Room | 80 | | 135 | 79 | | 119 | ns |
| | (-40 to 85) | | | 170 | 86 | | 126 | ns |
| | (-40 to 125) | | | 205 | 94 | | 134 | ns |
| Enable Turn-On Time | Room | 115 | | 180 | 70 | | 110 | ns |
| | (-40 to 85) | | | 215 | 76 | | 116 | ns |
| | (-40 to 125) | | | 250 | 90 | | 130 | ns |
| Enable Turn-Off Time | Room | 46 | | 110 | 51 | | 91 | ns |
| | (-40 to 85) | | | 145 | 54 | | 94 | ns |
| | (-40 to 125) | | | 180 | 55 | | 95 | ns |
| Break-Before-Make Time | Room | 37 | | | 17 | 1 | | ns |
| | (-40 to 85) | | 12 | | 22 | 1 | | ns |
| | (-40 to 125) | | 12 | | 27 | 1 | | ns |
| Charge Injection at $V_g$ = 0 V, $R_g$ = 0 (Ω) | Room | 0.86 | | | 5.84 | | | pC |
| Off Isolation | 100 kHz | < -90 | | | -95 | | | dB |
| | 1 MHz | -80 | | | -85 | | | dB |
| | 10 MHz | -61 | | | -65 | | | dB |

## Specification Comparison Table (Single 12 V): (Continued):

| PARAMETER | TEMP (°C) | DG9454 | | | DG9454E | | | |
|---|---|---|---|---|---|---|---|---|
| | | TYP | MIN | MAX | TYP | MIN | MAX | |
| **Dynamic Characteristics** | | | | | | | | |
| **Crosstalk** | 100 kHz | < -90 | | | -92 | | | dB |
| | 1 MHz | -81 | | | -73 | | | dB |
| | 10 MHz | -65 | | | -53 | | | dB |
| **Bandwidth, -3 dB** | Room | 540 | | | 356 | | | MHz |
| **Source Off Capacitance** | Room | 2 | | | 3.1 | | | pF |
| **Drain Off Capacitance** | Room | 3 | | | 4 | | | pF |
| **Drain On Capacitance** | Room | 6 | | | 8.8 | | | pF |
| **Total Harmonic Distortion** | Room | 0.01 | | | 0.075 | | | % |
| **Power Supplies** | | | | | | | | |
| **Power Supply Current I+** | Room | 0.05 | | 1 | 0.05 | | 1 | µA |
| | (-40 to 85) | | | 10 | | | 10 | µA |
| | (-40 to 125) | | | 10 | | | 10 | µA |
| **Ground Current $I_{GND}$** | Room | -0.05 | -1 | | -0.05 | -1 | | µA |
| | (-40 to 85) | | -10 | | | -10 | | µA |
| | (-40 to 125) | | -10 | | | -10 | | µA |
| **Logic Supply Current $I_L$** | Room | 0.05 | | 1 | 0.17 | | 1 | µA |
| | (-40 to 85) | | | 10 | | | 10 | µA |
| | (-40 to 125) | | | 10 | | | 10 | µA |