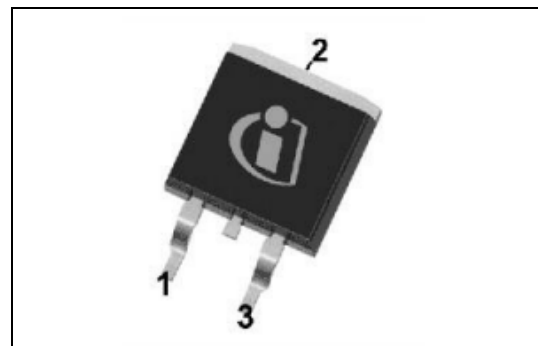


60V Radiation Tolerant power MOSFET

BUP06CN035L-01

Features

- LOW $R_{DS(on)}$
- Single Event Effect (SEE) tolerant
- Total Ionisation Dose (TID) tolerant
30 kRad approved
- N-channel



Product validation



Qualified according AEC Q101

Electrical parameters in Table 4 are guaranteed pre- and post-irradiation.

Description

Table 1 Product information

| Type | Comment | Pin Configuration | | | Package |
|----------------|---------|-------------------|---|---|----------------------------|
| | | 1 | 2 | 3 | |
| BUP06CN035L-01 | | G | D | S | D ² PAK (TO263) |

Table of contents

Features 1

Product validation 1

Description 1

Table of contents 2

1 Maximum ratings 3

2 Thermal characteristics 4

3 Electrical characteristics 5

4 Electrical characteristics diagrams 6

5 Package outlines 10

Maximum ratings

1 Maximum ratings

Table 2 Maximum ratings

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---------------------------------------|-----------|--------|------|----------|------|---|
| | | Min. | Typ. | Max. | | |
| Drain source voltage | V_{DS} | - | - | 60 | V | |
| Gate source voltage | V_{GS} | -20 | - | 20 | V | static |
| Drain gate voltage | V_{DG} | - | - | 60 | V | |
| Continuous drain current ¹ | I_D | - | - | 52 33 | A | $T_C = 25\text{ °C}$ $T_C = 100\text{ °C}$ |
| Continuous source current | I_S | - | - | 52 | A | |
| Drain current pulsed | I_{DM} | - | - | 162 | Apk | t_p limited by $T_{j,max}$ |
| Total power dissipation ² | P_{tot} | - | - | 150 | W | $T_C \leq 25\text{ °C}$ |
| Operating temperature | T_{op} | -40 | - | 125 | °C | |
| Storage temperature | T_{stg} | -55 | - | 150 | °C | |
| Junction temperature | T_j | -40 | - | 150 | °C | |
| Avalanche energy, single pulse | E_{AS} | - | - | 550 | mJ | $V_{DD} = 50V, L = 108\mu H$ |

¹ Limited by $T_{j,max}$

² For $T_C > 25\text{ °C}$ derating is required.

Thermal characteristics

2 Thermal characteristics

Table 3 Thermal characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--|-------------|--------|------|------|------|---|
| | | Min. | Typ. | Max. | | |
| Thermal resistance, junction - case | $R_{th,JC}$ | - | - | 0.83 | K/W | |
| Thermal resistance, junction - ambient | $R_{th,JA}$ | - | - | 62 | K/W | Device on PCB, minimal footprint |
| | | - | 35 | - | | Device on 40mm*40mm *1.5mm epoxy PCB FR4 with 6cm ² (one layer, 70μm thickness) copper area for drain connection and cooling. PCB is vertical without air stream cooling |
| Soldering temperature | T_{sol} | - | - | 260 | °C | Reflow MSL 1 |

Electrical characteristics

3 Electrical characteristics

at $T_A=25^\circ\text{C}$, unless otherwise specified

Table 4 Static characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|--------------|--------------|------|------------|------------------|---|
| | | Min. | Typ. | Max. | | |
| Drain-source breakdown voltage | BV_{DSS} | 60 | - | - | V | $I_D = 0.25\text{mA}$, $V_{GS} = 0\text{V}$ |
| Gate threshold voltage | $V_{GS(th)}$ | 2 | - | 4 | V | $I_D = 1.0\text{mA}$, $V_{DS} \geq V_{GS}$ |
| Gate to source leakage current | I_{GSS} | -100 -200 | - | 100 200 | nA | $V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$, $T_A = 25^\circ\text{C}$ $V_{DS} = 0\text{V}$, $V_{GS} = \pm 20\text{V}$, $T_A = 125^\circ\text{C}$ |
| Zero gate voltage drain current | I_{DSS} | - | - | 25 250 | μA | $V_{DS} = 48\text{V}$, $V_{GS} = 0\text{V}$, $T_A = 25^\circ\text{C}$ $V_{DS} = 48\text{V}$, $V_{GS} = 0\text{V}$, $T_A = 125^\circ\text{C}$ |
| Drain source on-state resistance ¹ | $R_{DS(ON)}$ | - | 27 | 35 45 | $\text{m}\Omega$ | $V_{GS} = 10\text{V}$, $I_D = 23\text{A}$, $T_A = 25^\circ\text{C}$ $V_{GS} = 10\text{V}$, $I_D = 23\text{A}$, $T_A = 125^\circ\text{C}$ |
| Diode forward voltage ^{1,2} | V_{SD} | - | - | 1.2 | V | $V_{GS} = 0\text{V}$, $I_S = 35\text{A}$ |

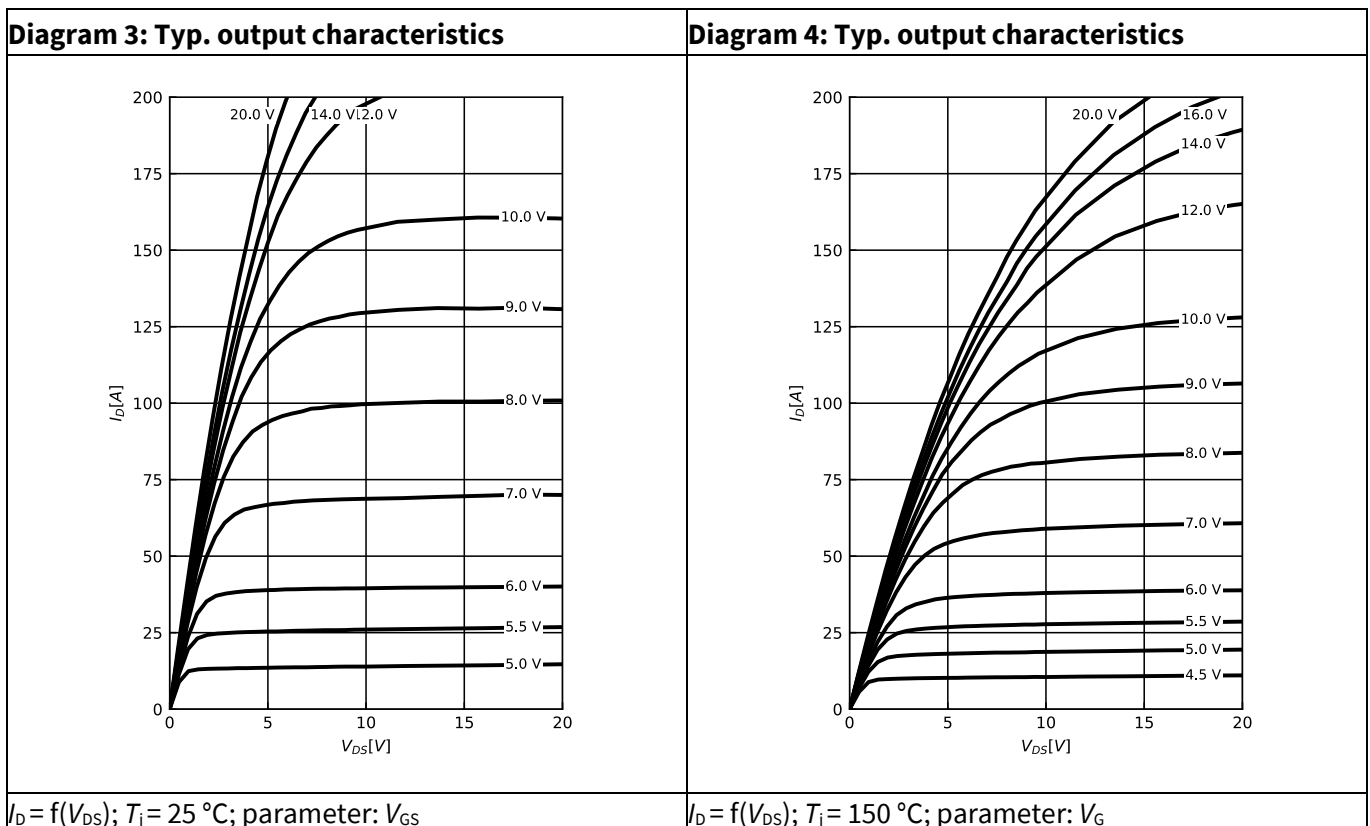
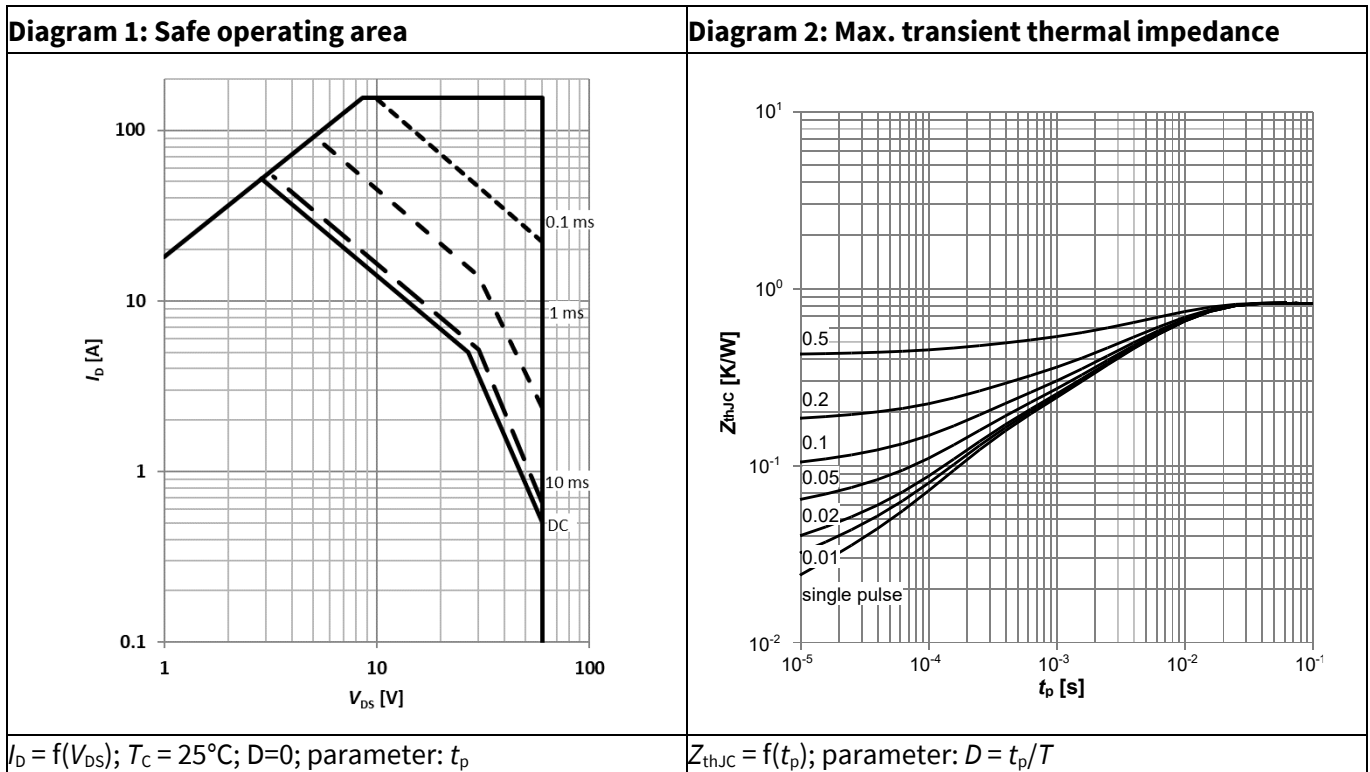
Table 5 Dynamic characteristics

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|--|--------------|--------|------|------|------|---|
| | | Min. | Typ. | Max. | | |
| Turn-on delay time | $t_{d(ON)}$ | - | 12 | - | ns | $V_{DD} = 50\% V_{DS}$, $I_D = 23\text{A}$, $R_G = 4.7\Omega$ |
| Rise time | t_r | - | 10 | - | ns | $V_{DD} = 50\% V_{DS}$, $I_D = 23\text{A}$, $R_G = 4.7\Omega$ |
| Turn-off delay time | $t_{d(OFF)}$ | - | 19 | - | ns | $V_{DD} = 50\% V_{DS}$, $I_D = 23\text{A}$, $R_G = 4.7\Omega$ |
| Fall time | t_f | - | 8 | - | ns | $V_{DD} = 50\% V_{DS}$, $I_D = 23\text{A}$, $R_G = 4.7\Omega$ |
| Reverse recovery time | t_{rr} | - | 130 | - | ns | $V_{DD} \leq 50\text{V}$, $I_D = 35\text{A}$ |
| Common source input capacitance | C_{iss} | - | 1.58 | - | nF | $V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$ |
| Common source output capacitance | C_{oss} | - | 416 | - | pF | $V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$ |
| Common source reverse transfer capacitance | C_{rss} | - | 110 | - | pF | $V_{DS} = 40\text{V}$, $V_{GS} = 0\text{V}$, $f = 1.0\text{MHz}$ |
| Total gate charge | Q_G | - | 26 | - | nC | $V_{DD} = 50\% V_{DS}$, $V_{GS} = 10\text{V}$, $I_D = 35\text{A}$ |

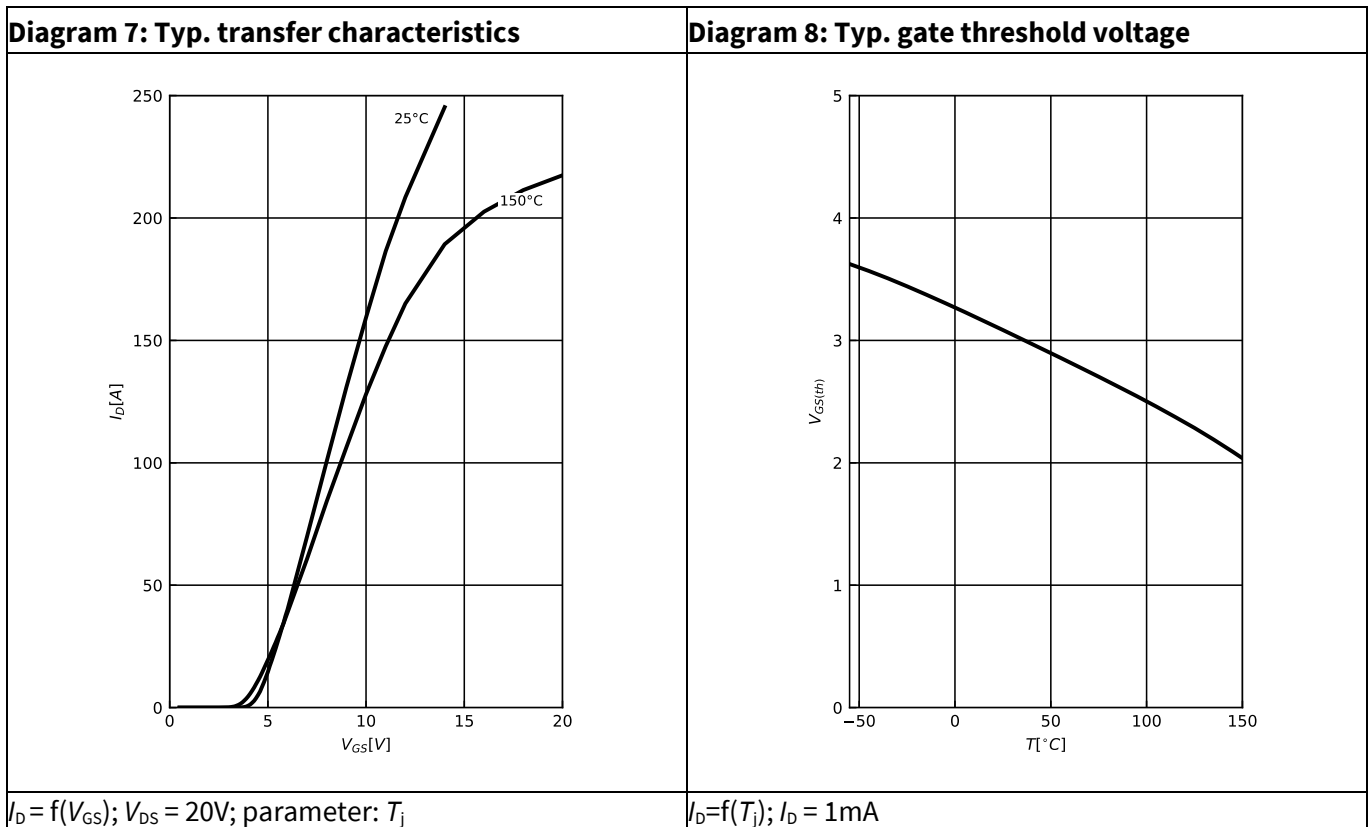
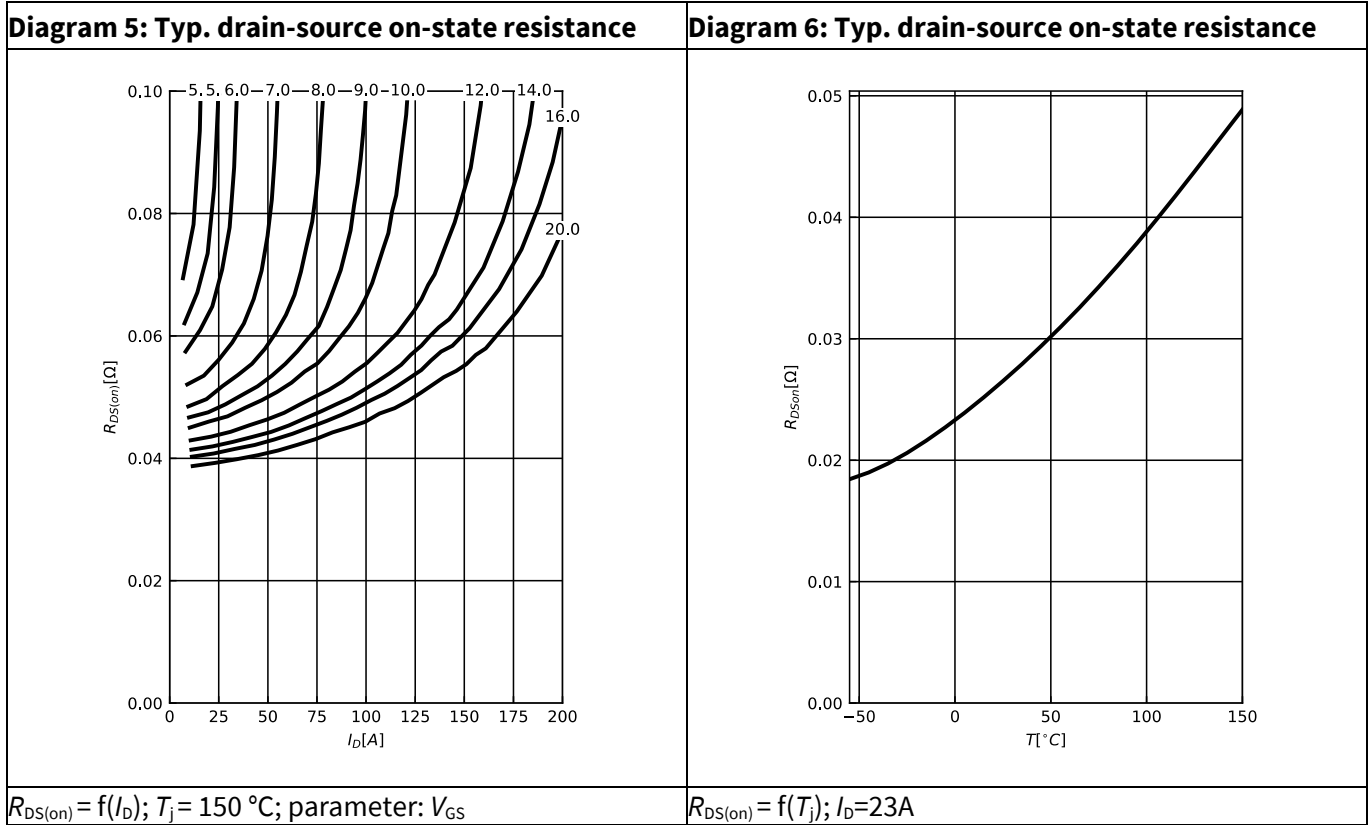
¹ Pulsed measurement: Pulse Width < 300 μs , Duty Cycle < 2.0%.

² Measured within 2.0 mm of case

4 Electrical characteristics diagrams

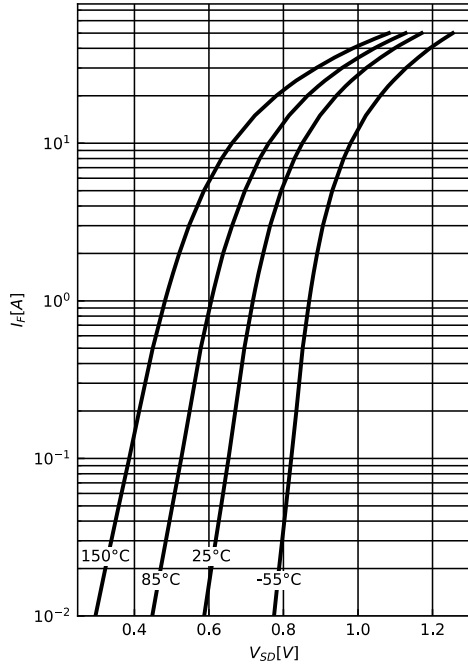


Electrical characteristics diagrams



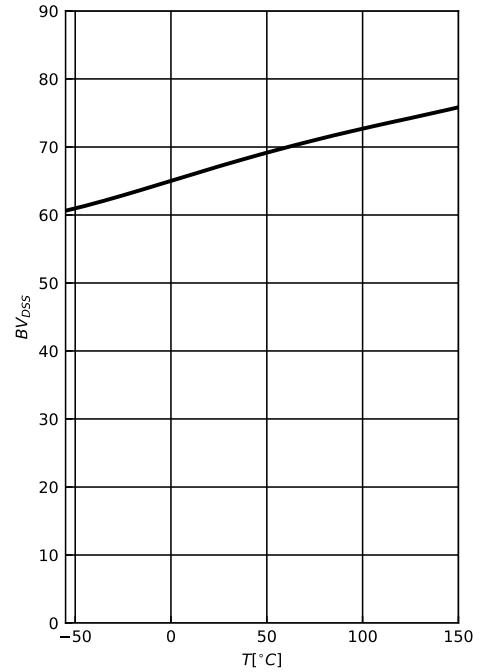
Electrical characteristics diagrams

Diagram 9: Forward characteristics of reverse diode



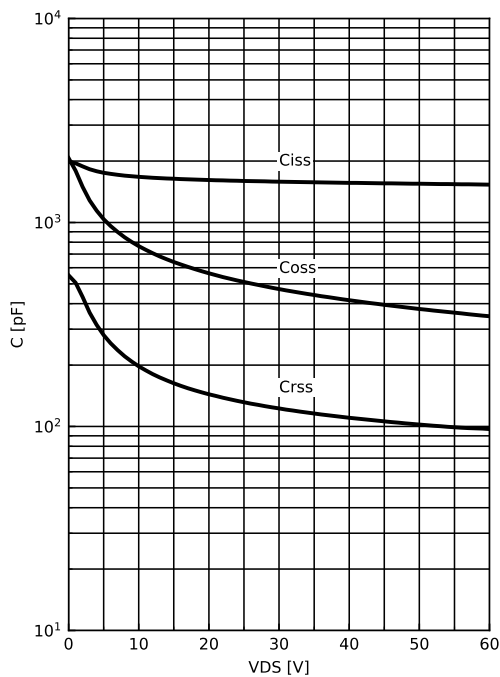
$I_F = f(V_{SD});$ parameter: T_j

Diagram 10: Drain-source breakdown voltage



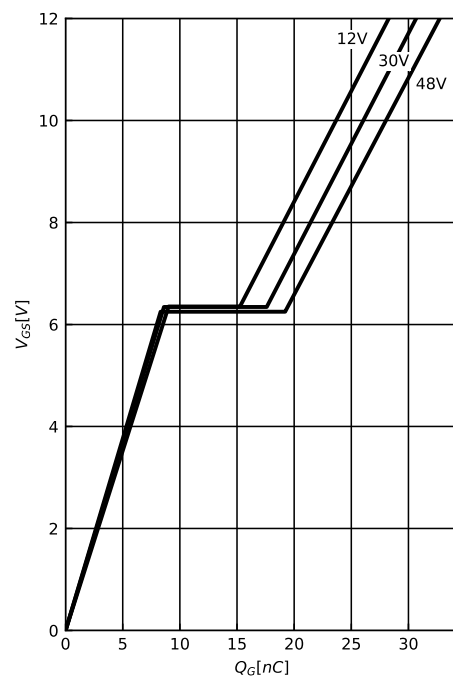
$BV_{DSS} = f(T_j); I_D = 250\mu A$

Diagram 11: Typ. capacitances



$C = f(V_{DS}); V_{GS} = 0 V; f = 1 MHz$

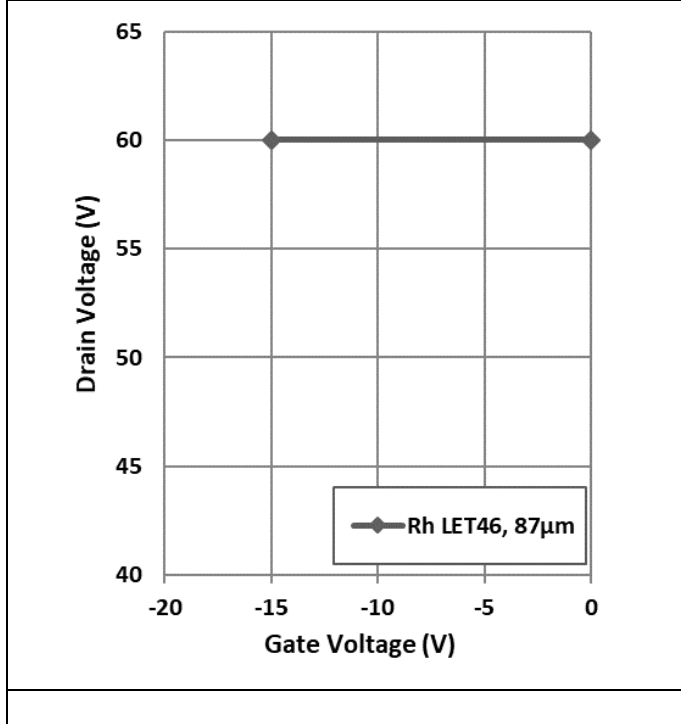
Diagram 12: Typ. gate charge



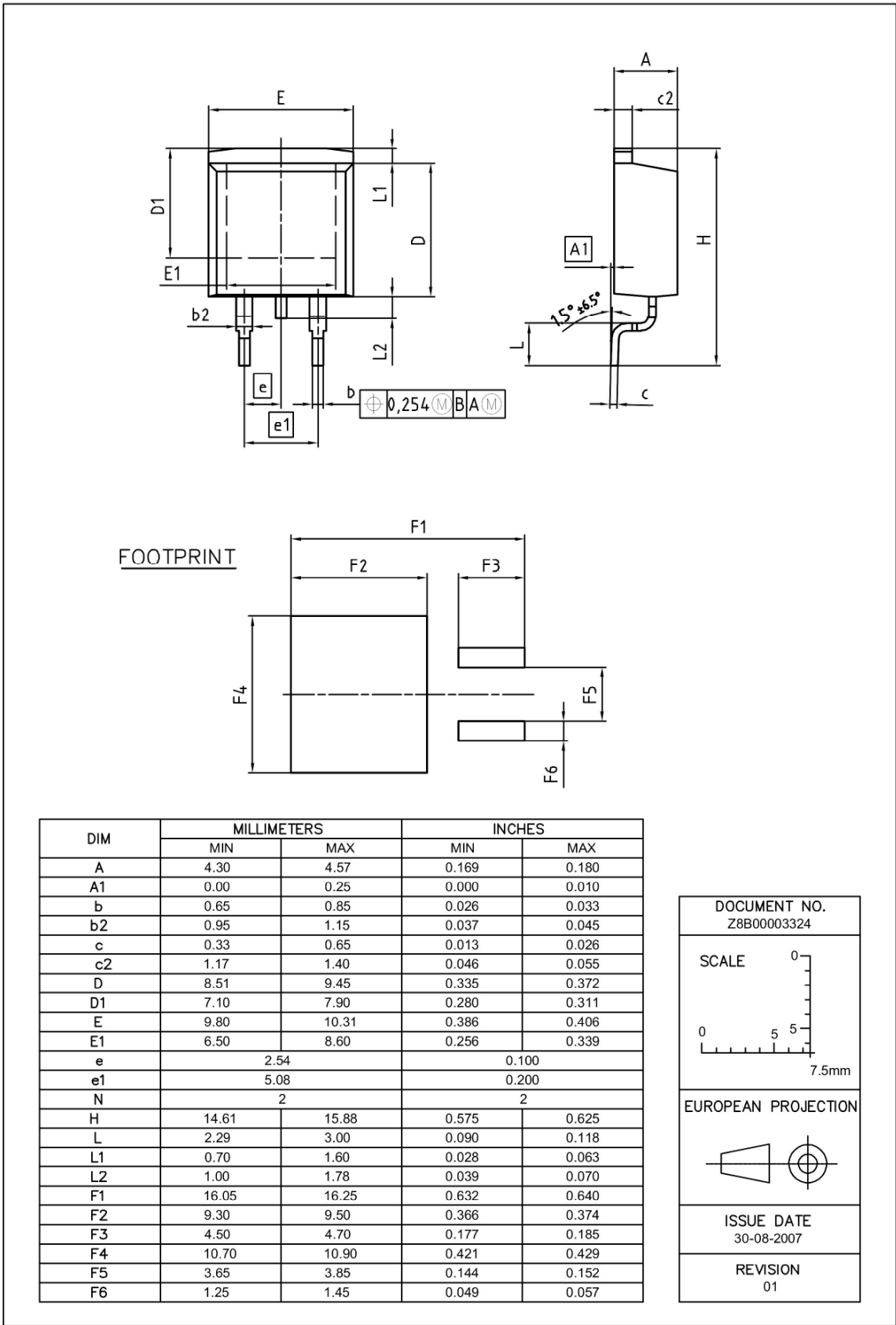
$V_{GS} = f(Q_{gate}); I_D = 35.0 A$ pulsed; parameter: V_{DD}

Electrical characteristics diagrams

Diagram 13: SEE - Safe operating area



5 Package outlines



60V Radiation Tolerant power MOSFET

BUP06CN035L-01

Package outlines



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