## Features
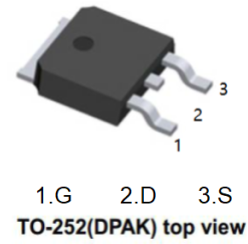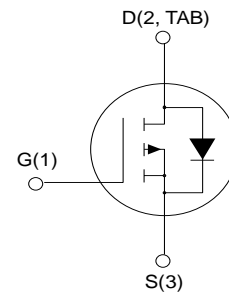
- $V_{DS}$ (V) = -60V
- $R_{DS(ON)}$ < 27mΩ ($V_{GS}$ = -10V)
- $R_{DS(ON)}$ < 35mΩ ($V_{GS}$ = -4.5V)
- Very lowon-resistance
- Very low gate charge
- High avalanche ruggedness
- Low gate drive power loss

## Applications

- Switching applications

1.G    2.D    3.S
TO-252(DPAK) top view

D(2, TAB)

G(1)

S(3)

## Electrical ratings

**Table 2: Absolute maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source voltage | 60 | V |
| $V_{GS}$ | Gate-source voltage | ± 20 | V |
| $I_D$ | Drain current (continuous) at $T_C$ = 25 °C | 35 | A |
| $I_D$ | Drain current (continuous) at $T_C$ = 100 °C | 25 | A |
| $I_{DM}$[1] | Drain current (pulsed) | 140 | A |
| $P_{TOT}$ | Total dissipation at $T_C$ = 25 °C | 70 | W |
| $T_{stg}$ | Storage temperature range | -55 to 175 | °C |
| $T_j$ | Operating junction temperature range | | |

**Notes:**

[1]Pulse width limited by safe operating area.

**Table 3: Thermal data**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{thj-case}$ | Thermal resistance junction-case max | 2.14 | °C/W |

**-60V P-Channel MOSFET**

## Electrical characteristics

($T_C$ = 25 °C unless otherwise specified)

**Table 4: Static**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------------|------|------|------|------|
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | $V_{GS}$ = 0 V, $I_D$ = 250 μA | 60 | | | V |
| $I_{DSS}$ | Zero gate voltage Drain current | $V_{GS}$ = 0 V, $V_{DS}$ = 60 V | | | 1 | μA |
| | | $V_{GS}$ = 0 V, $V_{DS}$ = 60 V, $T_C$ = 125 °C[(1)] | | | 10 | μA |
| $I_{GSS}$ | Gate-body leakage current | $V_{DS}$ = 0 V, $V_{GS}$ = ± 20 V | | | ±100 | nA |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 μA | -1.1 | -1.8 | -2.5 | V |
| $R_{DS(on)}$ | Static drain-source on-resistance | $V_{GS}$ = 10 V, $I_D$ = 17.5 A | | 25 | 27 | mΩ |
| | | $V_{GS}$ = 4.5 V, $I_D$= 17.5 A | | 30 | 35 | |

**Notes:**

[(1)]Defined by design, not subject to production test.

**Table 5: Dynamic**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------------|------|------|------|------|
| $C_{iss}$ | Input capacitance | $V_{DS}$ = 25 V, f = 1 MHz, $V_{GS}$ = 0 V | | 3780 | | pF |
| $C_{oss}$ | Output capacitance | | | 262 | | pF |
| $C_{rss}$ | Reverse transfer capacitance | | | 170 | | pF |
| $Q_g$ | Total gate charge | $V_{DD}$ = 30 V, $I_D$ = 35 A, $V_{GS}$ = 0 to 4.5 V (see Figure 14: "Gate charge test circuit") | | 30 | | nC |
| $Q_{gs}$ | Gate-source charge | | | 10.8 | | nC |
| $Q_{gd}$ | Gate-drain charge | | | 10.5 | | nC |
| $R_G$ | Gate input resistance | $I_D$ = 0 A, gate DC bias = 0 V, f = 1 MHz, magnitude of alternative signal = 20 mV | | 1.7 | | Ω |

**Table 6: Switching times**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------------|------|------|------|------|
| $t_{d(on)}$ | Turn-on delay time | $V_{DD}$ = 30 V, $I_D$ = 17.5 A $R_G$ = 4.7 Ω, $V_{GS}$ = 10 V (see Figure 13: "Switching times test circuit for resistive load") | | 51.4 | | ns |
| $t_r$ | Rise time | | | 39 | | ns |
| $t_{d(off)}$ | Turn-off-delay time | | | 171 | | ns |
| $t_f$ | Fall time | | | 21 | | ns |

**Table 7: Source drain diode**

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|--------|-----------|-----------------|------|------|------|------|
| $V_{SD}$ [(1)] | Forward on voltage | $V_{GS}$ = 0 V, $I_{SD}$ = 35 A | | | 1.5 | V |
| $t_{rr}$ | Reverse recovery time | $I_{SD}$ = 35 A, di/dt = 100 A/μs, $V_{DD}$ = 48 V, (see Figure 15: "Test circuit for inductive load switching and diode recovery times") | | 34 | | ns |
| $Q_{rr}$ | Reverse recovery charge | | | 48 | | nC |
| $I_{RRM}$ | Reverse recovery current | | | 2.8 | | A |

**Notes:**

[(1)]Pulse test: pulse duration = 300 μs, duty cycle 1.5%

## Electrical characteristics (curves)

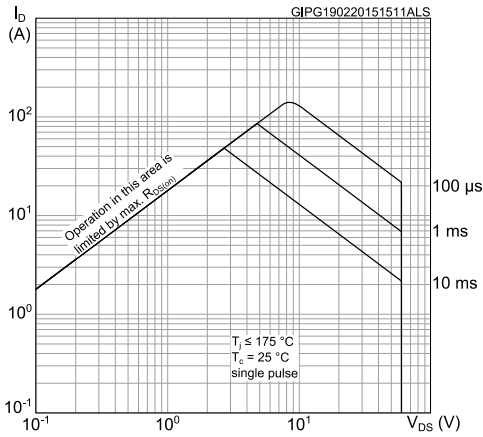### Figure 2: Safe operating area


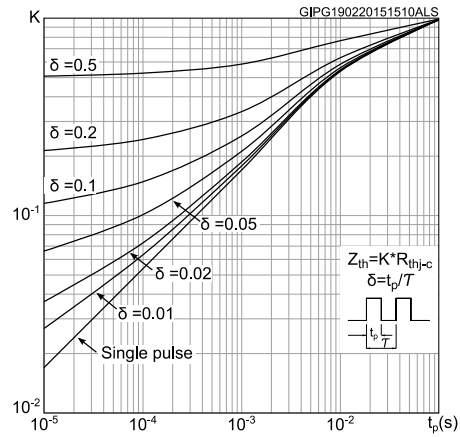
### Figure 3: Thermal impedance
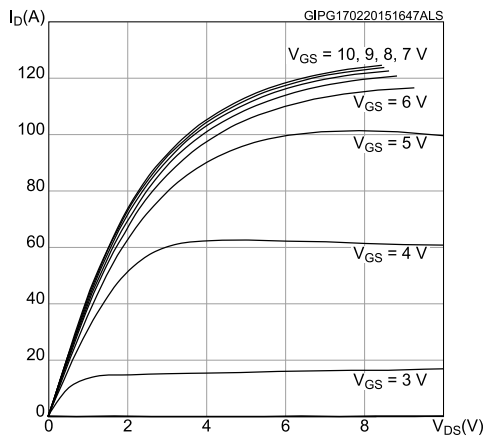


### Figure 4: Output characteristics



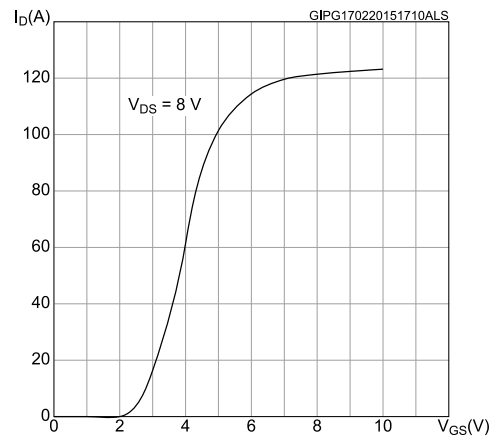### Figure 5: Transfer characteristics



### Figure 6: Normalized gate threshold voltage vs temperature
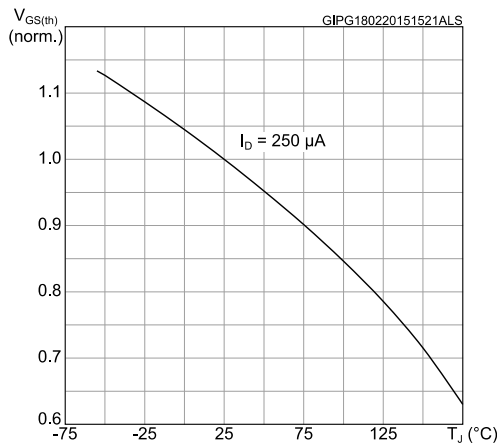

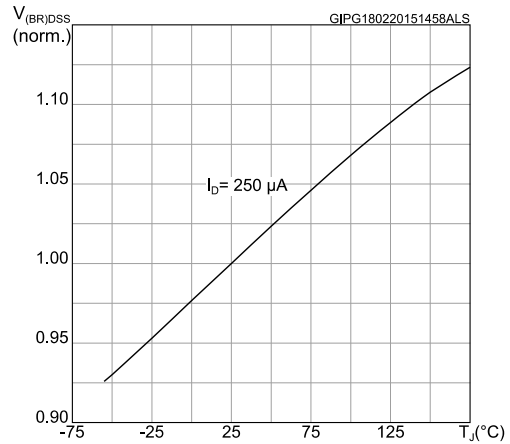
### Figure 7: Normalized V(BR)DSS vs temperature

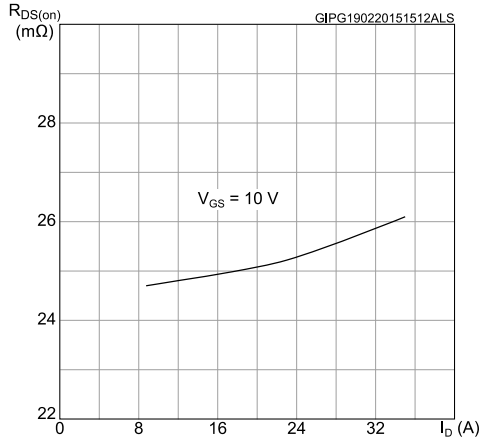**Figure 8: Static drain-source on-resistance**



**Figure 9: Normalized on-resistance vs. temperature**
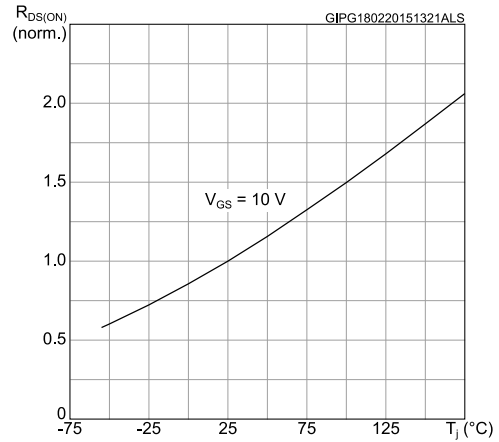


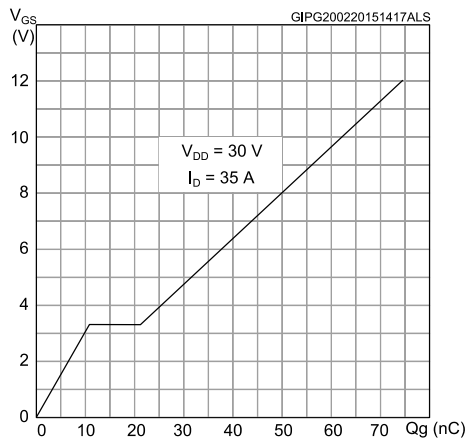**Figure 10: Gate charge vs gate-source voltage**



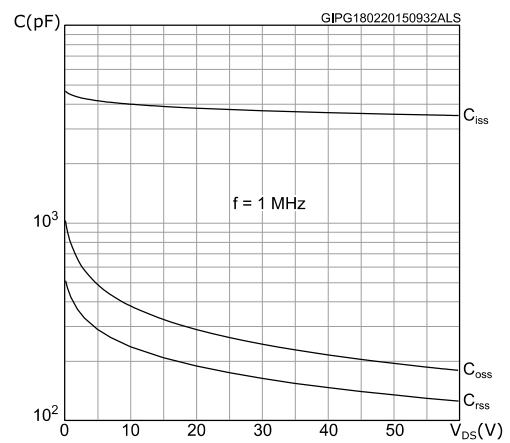**Figure 11: Capacitance variations voltage**



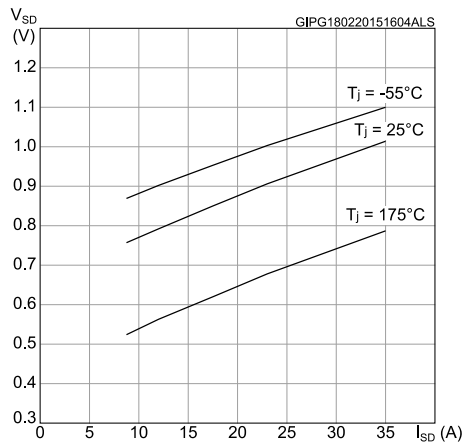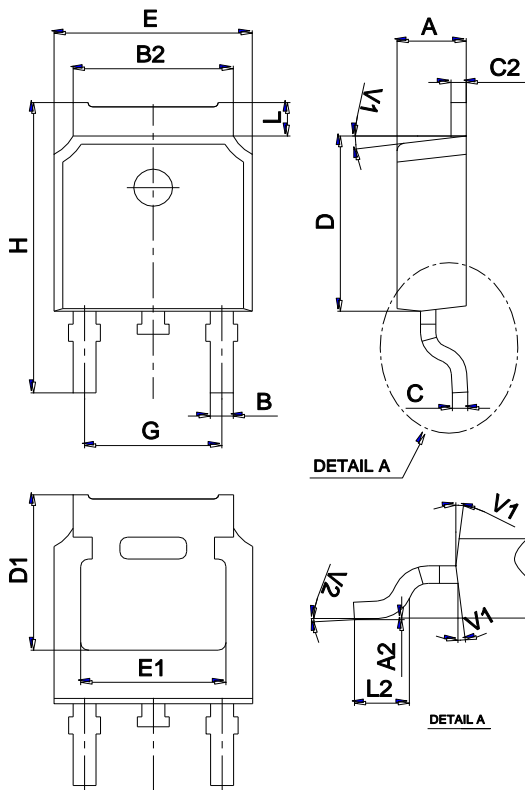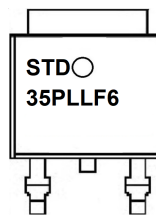**Figure 12: Source-drain diode forward characteristics**

## Package Mechanical Data  TO-252



| Ref. | Dimensions | | | | | |
|---|---|---|---|---|---|---|
| | Millimeters | | | Inches | | |
| | Min. | Typ. | Max. | Min. | Typ. | Max. |
| A | 2.10 | | 2.50 | 0.083 | | 0.098 |
| A2 | 0 | | 0.10 | 0 | | 0.004 |
| B | 0.66 | | 0.86 | 0.026 | | 0.034 |
| B2 | 5.18 | | 5.48 | 0.202 | | 0.216 |
| C | 0.40 | | 0.60 | 0.016 | | 0.024 |
| C2 | 0.44 | | 0.58 | 0.017 | | 0.023 |
| D | 5.90 | | 6.30 | 0.232 | | 0.248 |
| D1 | | 5.30REF | | | 0.209REF | |
| E | 6.40 | | 6.80 | 0.252 | | 0.268 |
| E1 | 4.63 | | | 0.182 | | |
| G | 4.47 | | 4.67 | 0.176 | | 0.184 |
| H | 9.50 | | 10.70 | 0.374 | | 0.421 |
| L | 1.09 | | 1.21 | 0.043 | | 0.048 |
| L2 | 1.35 | | 1.65 | 0.053 | | 0.065 |
| V1 | | 7° | | | 7° | |
| V2 | 0° | | 6° | 0° | | 6° |

## Marking



STD○
35PLLF6

## Ordering information

| Order code | Package | Baseqty | Deliverymode |
|---|---|---|---|
| STD35P6LLF6 | TO-252 | 2500 | Tape and reel |