

# CPH3456

## Power MOSFET 20V, 71mΩ, 3.5A, Single N-Channel



ON Semiconductor®

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### Features

- ON-Resistance  $R_{DS(on)} = 71\text{m}\Omega$  (typ)
- 1.8V Drive
- Pb-Free, Halogen Free and RoHS Compliance

### Specifications

**Absolute Maximum Ratings** at  $T_a = 25^\circ\text{C}$

| Parameter                                                                              | Symbol    | Value       | Unit |
|----------------------------------------------------------------------------------------|-----------|-------------|------|
| Drain to Source Voltage                                                                | $V_{DS}$  | 20          | V    |
| Gate to Source Voltage                                                                 | $V_{GS}$  | $\pm 12$    | V    |
| Drain Current (DC)                                                                     | $I_D$     | 3.5         | A    |
| Drain Current (Pulse)<br>$PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$               | $I_{DP}$  | 14          | A    |
| Power Dissipation<br>When mounted on ceramic substrate<br>(900mm <sup>2</sup> × 0.8mm) | $P_D$     | 1.0         | W    |
| Junction Temperature                                                                   | $T_J$     | 150         | °C   |
| Storage Temperature                                                                    | $T_{stg}$ | -55 to +150 | °C   |

This product is designed to "ESD immunity < 200V\*", so please take care when handling.

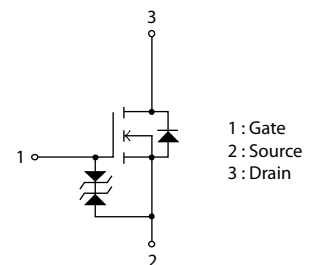
\* Machine Model

### Thermal Resistance Ratings

| Parameter                                                                                | Symbol          | Value | Unit |
|------------------------------------------------------------------------------------------|-----------------|-------|------|
| Junction to Ambient<br>When mounted on ceramic substrate<br>(900mm <sup>2</sup> × 0.8mm) | $R_{\theta JA}$ | 125   | °C/W |

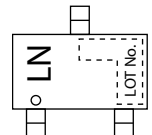
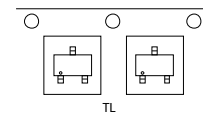
| $V_{DS}$ | $R_{DS(on)}$ Max | $I_D$ Max |
|----------|------------------|-----------|
| 20V      | 71 mΩ@4.5V       | 3.5A      |
|          | 103 mΩ@2.5V      |           |
|          | 156 mΩ@1.8V      |           |

### Electrical Connection N-Channel



### Packing Type: TL

### Marking



Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

# CPH3456

## Electrical Characteristics at $T_a = 25^\circ\text{C}$

| Parameter                                  | Symbol        | Conditions                                                     | Value |      |          | Unit             |
|--------------------------------------------|---------------|----------------------------------------------------------------|-------|------|----------|------------------|
|                                            |               |                                                                | min   | typ  | max      |                  |
| Drain to Source Breakdown Voltage          | $V_{(BR)DSS}$ | $I_D=1\text{mA}$ , $V_{GS}=0\text{V}$                          | 20    |      |          | V                |
| Zero-Gate Voltage Drain Current            | $I_{DSS}$     | $V_{DS}=20\text{V}$ , $V_{GS}=0\text{V}$                       |       |      | 1        | $\mu\text{A}$    |
| Gate to Source Leakage Current             | $I_{GSS}$     | $V_{GS}=\pm 8\text{V}$ , $V_{DS}=0\text{V}$                    |       |      | $\pm 10$ | $\mu\text{A}$    |
| Gate Threshold Voltage                     | $V_{GS(th)}$  | $V_{DS}=10\text{V}$ , $I_D=1\text{mA}$                         | 0.4   |      | 1.3      | V                |
| Forward Transconductance                   | $g_{FS}$      | $V_{DS}=10\text{V}$ , $I_D=1.5\text{A}$                        |       | 2.8  |          | S                |
| Static Drain to Source On-State Resistance | $R_{DS(on)1}$ | $I_D=1.5\text{A}$ , $V_{GS}=4.5\text{V}$                       |       | 54   | 71       | $\text{m}\Omega$ |
|                                            | $R_{DS(on)2}$ | $I_D=1\text{A}$ , $V_{GS}=2.5\text{V}$                         |       | 73   | 103      | $\text{m}\Omega$ |
|                                            | $R_{DS(on)3}$ | $I_D=0.5\text{A}$ , $V_{GS}=1.8\text{V}$                       |       | 104  | 156      | $\text{m}\Omega$ |
| Input Capacitance                          | $C_{iss}$     | $V_{DS}=10\text{V}$ , $f=1\text{MHz}$                          |       | 260  |          | pF               |
| Output Capacitance                         | $C_{oss}$     |                                                                |       | 65   |          | pF               |
| Reverse Transfer Capacitance               | $C_{rss}$     |                                                                |       | 50   |          | pF               |
| Turn-ON Delay Time                         | $t_d(on)$     | See specified Test Circuit                                     |       | 6.2  |          | ns               |
| Rise Time                                  | $t_r$         |                                                                |       | 19   |          | ns               |
| Turn-OFF Delay Time                        | $t_d(off)$    |                                                                |       | 30   |          | ns               |
| Fall Time                                  | $t_f$         |                                                                |       | 28   |          | ns               |
| Total Gate Charge                          | $Q_g$         | $V_{DS}=10\text{V}$ , $V_{GS}=4.5\text{V}$ , $I_D=3.5\text{A}$ |       | 2.8  |          | nC               |
| Gate to Source Charge                      | $Q_{gs}$      |                                                                |       | 0.6  |          | nC               |
| Gate to Drain "Miller" Charge              | $Q_{gd}$      |                                                                |       | 0.9  |          | nC               |
| Forward Diode Voltage                      | $V_{SD}$      | $I_S=3.5\text{A}$ , $V_{GS}=0\text{V}$                         |       | 0.85 | 1.2      | V                |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## Switching Time Test Circuit

