# 20V P-Channel Enhancement Mode MOSFET

## Description

The PECN2305VR uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications.

## General Features

- $V_{DS}$ =-20V，$I_D$ =-4.2A
  $R_{DS(ON)}$(Typ.)=43mΩ @$V_{GS}$=-4.5V
  $R_{DS(ON)}$(Typ.)=57mΩ @$V_{GS}$=-2.5V
- High power and current handing capability
- Lead free product is acquired
- Surface mount package

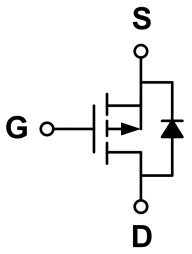
## Application

- PWM applications
- Load switch

## Package

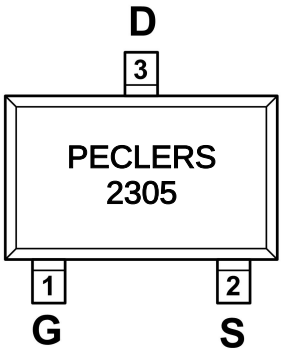
- SOT-23

## Schematic diagram




## Marking and pin assignment

SOT-23
(TOP VIEW)




## Ordering Information

| Part Number | Storage Temperature | Package | Devices Per Reel |
|---|---|---|---|
| PECN2305VR | -55°C to +150°C | SOT-23 | 3000 |

## Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

| parameter | | symbol | limit | unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DS}$ | -20 | V |
| Gate-source voltage | | $V_{GS}$ | ±12 | V |
| Drain Current-Continuous (Silicon Limited) | $T_A$=25°C | $I_D$ | -4.2 | A |
| | $T_A$=70°C | | -3.3 | A |
| Pulsed Drain Current (Package Limited) | | $I_{DM}$ | -30 | A |
| Maximum power dissipation | $T_A$=25°C | $P_D$ | 2.4 | W |
| | $T_A$=70°C | | 1.52 | |
| Operating junction Temperature range | | Tj | -55—150 | ℃ |

## Electrical Characteristics (TA=25℃ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF Characteristics** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=-250μA | -20 | - | - | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=-20V, $V_{GS}$=0V | - | - | -1 | μA |
| Gate-body leakage | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±12V | - | - | ±100 | nA |
| Body-Diode Continuous current | $I_S$ | - | - | -2 | - | A |
| **ON Characteristics** | | | | | | |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250μA | -0.45 | -0.9 | -1.35 | V |
| Drain-source on-state resistance | $R_{DS(ON)}$ | $V_{GS}$=-4.5V, $I_D$=-4A | - | 43 | 50 | mΩ |
| | | $V_{GS}$=-2.5V, $I_D$=-2A | - | 57 | 63 | |
| Forward transconductance | gfs | $V_{GS}$=-5V, $I_D$=-4.2A | - | 6.8 | - | S |
| **Dynamic Characteristics** | | | | | | |
| Input capacitance | $C_{ISS}$ | $V_{DS}$=-10V ,$V_{GS}$=0V f=1.0MHz | - | 882 | - | pF |
| Output capacitance | $C_{OSS}$ | | - | 84 | - | |
| Reverse transfer capacitance | $C_{RSS}$ | | - | 74 | - | |
| **Switching Characteristics** | | | | | | |
| Turn-on delay time | $t_{D(ON)}$ | $V_{DD}$=-10V $I_D$=-2.8A $V_{GS}$=-4.5V $R_L$=2.5ohm $R_{GEN}$=3ohm | - | 13 | - | ns |
| Rise time | tr | | - | 9 | - | |
| Turn-off delay time | $t_{D(OFF)}$ | | - | 19 | - | |
| Fall time | tf | | - | 29 | - | |
| Total gate charge | Qg | $V_{DS}$=-10V,$I_D$=-4A $V_{GS}$=-4.5V | - | 19.6 | - | nC |
| Gate-source charge | Qgs | | - | 1.8 | - | |
| Gate-drain charge | Qgd | | - | 2.4 | - | |
| **DRAIN-SOURCE DIODE CHARACTERISTICS** | | | | | | |
| Diode forward voltage | $V_{SD}$ | $V_{GS}$=0V,Is=-1A | - | -0.64 | -1 | V |

## Thermal Characteristics

| Parameter | | Symbol | Typ | Max | Unit |
|---|---|---|---|---|---|
| Maximum Junction-to-Ambient[A] | t≤ 10s | $R_{\theta JA}$ | 65 | 80 | ℃/W |
| Maximum Junction-to-Ambient[A] | Steady-State | | 85 | 100 | |
| Maximum Junction-to-Lead[B] | Steady-State | $R_{\theta JC}$ | 43 | 52 | |

## Typical Performance Characteristics

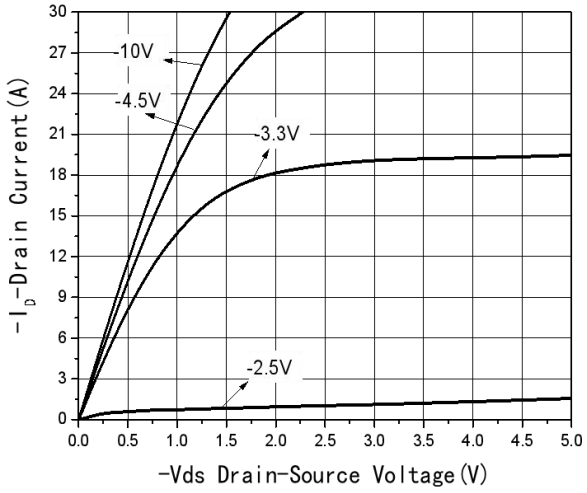



**Fig1 Output Characteristics**

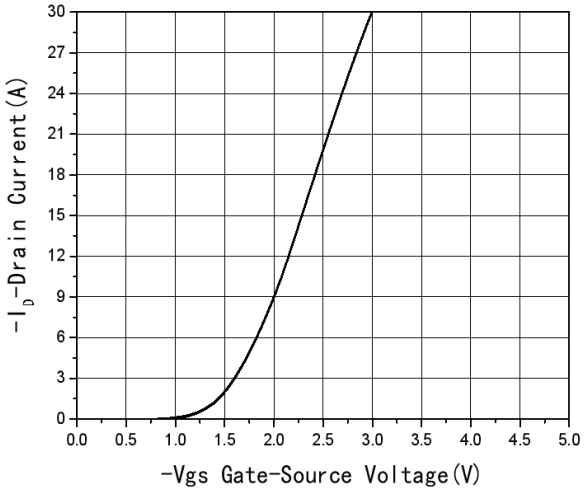



**Fig2 Transfer Characteristics**

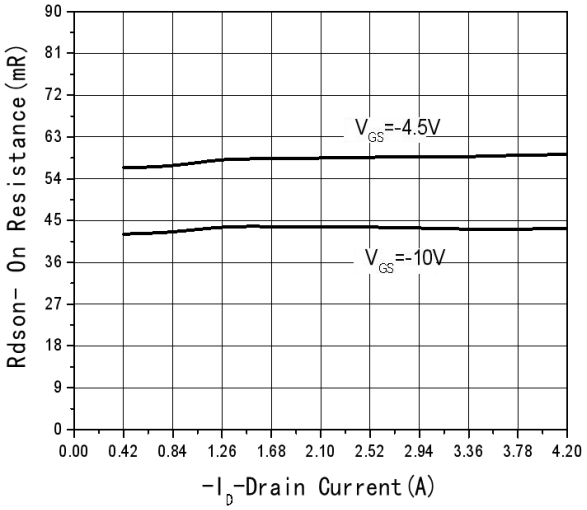



**Fig3 Rdson-Drain current**

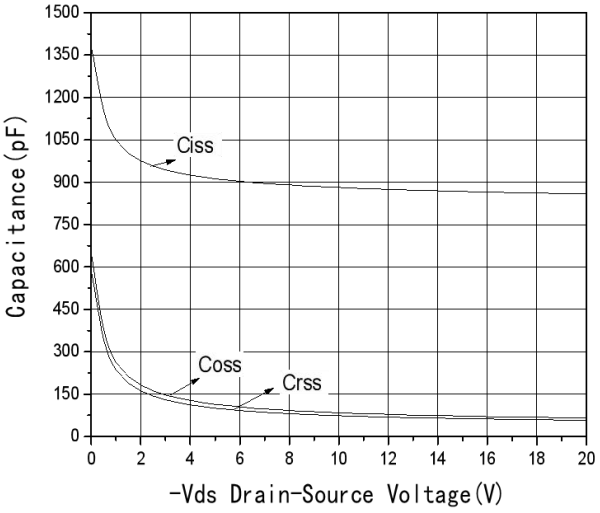



**Fig4 Capacitance vs Vds**

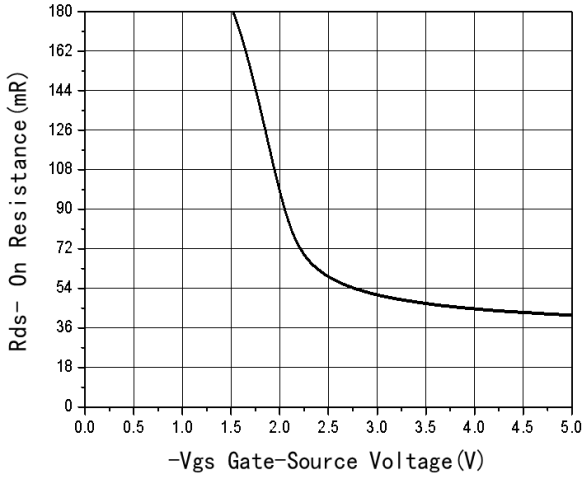



**Fig5 Rdson-Gate Drain voltage**

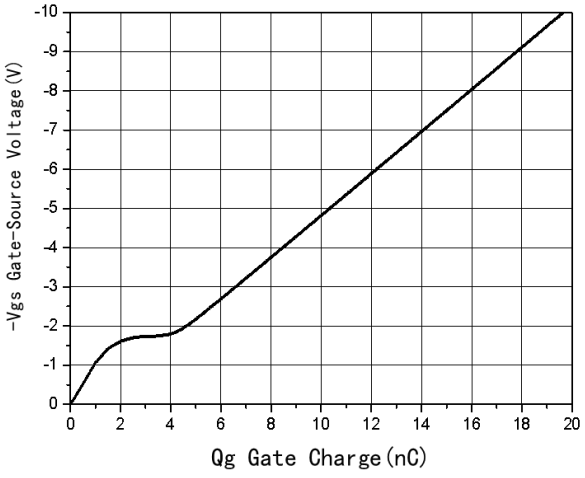



**Fig6 Gate Charge**

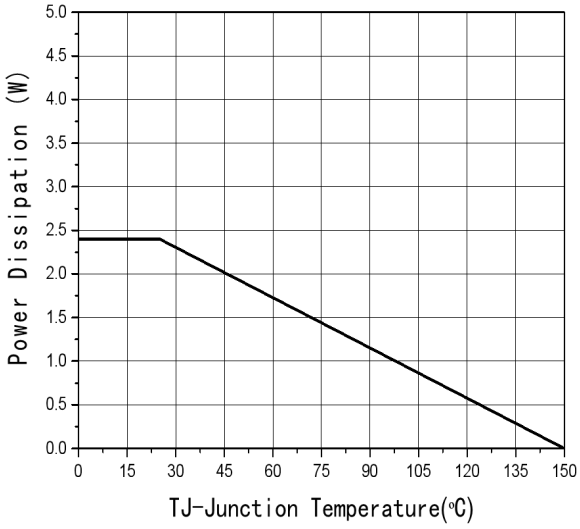



**Fig7 Power De-rating**

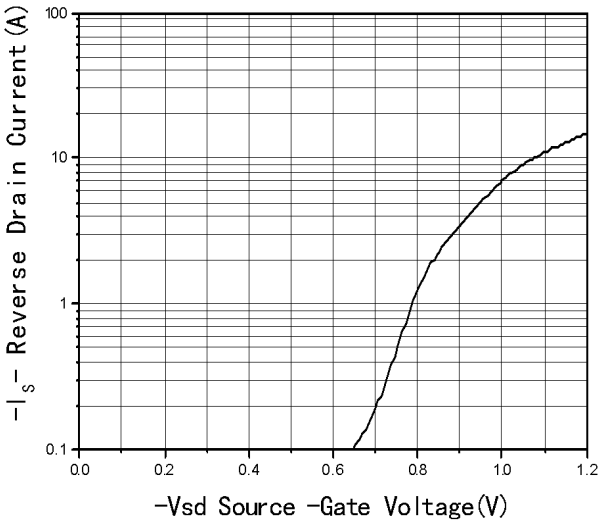
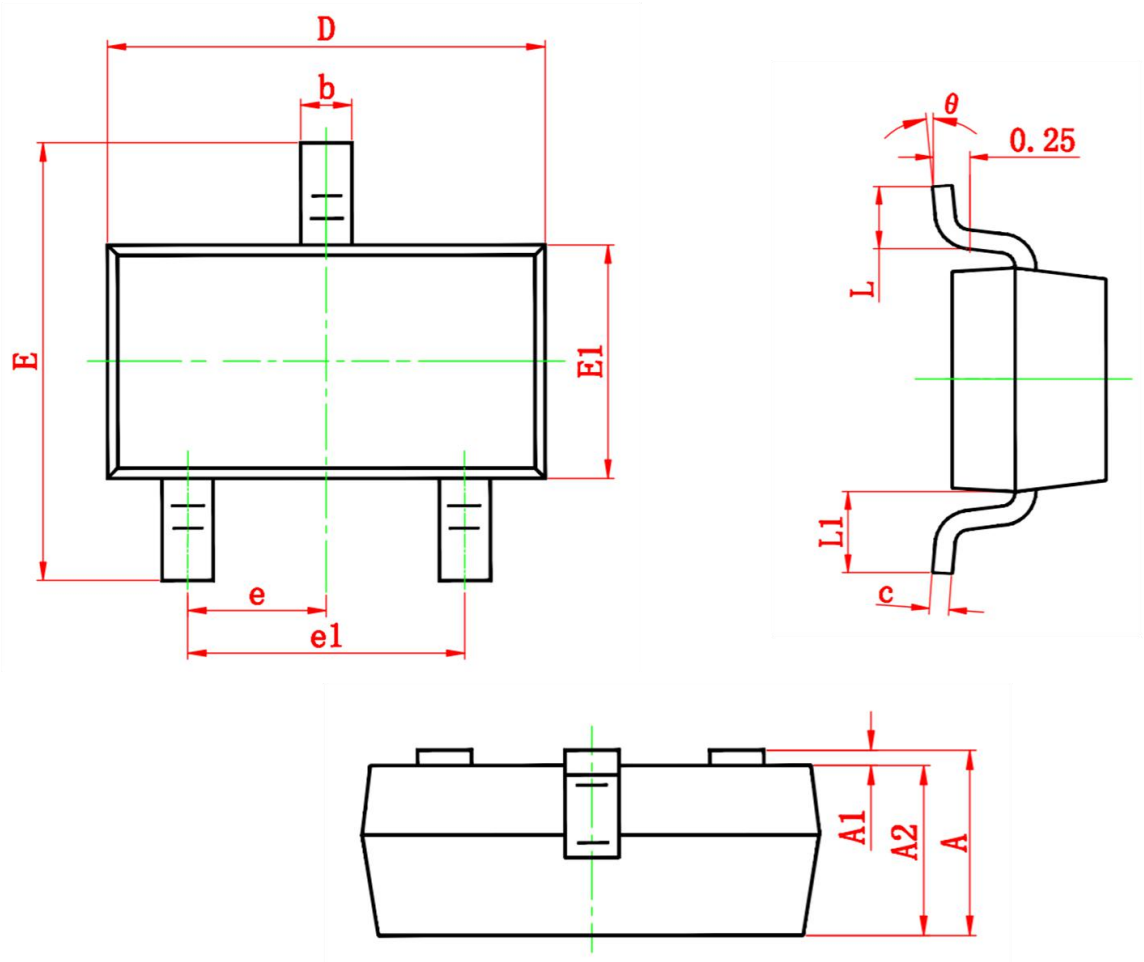



**Fig8 Source-Drain Diode Forward**

## Package Information

- **SOT-23**




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.900 | 1.150 | 0.035 | 0.045 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 0.900 | 1.050 | 0.035 | 0.041 |
| b | 0.300 | 0.500 | 0.012 | 0.020 |
| c | 0.080 | 0.150 | 0.003 | 0.006 |
| D | 2.800 | 3.000 | 0.110 | 0.118 |
| E | 2.250 | 2.550 | 0.089 | 0.100 |
| E1 | 1.200 | 1.400 | 0.047 | 0.055 |
| e | 0.950 TYP. | | 0.037 TYP. | |
| e1 | 1.800 | 2.000 | 0.071 | 0.079 |
| L | 0.300 | 0.500 | 0.012 | 0.020 |
| L1 | 0.550 REF. | | 0.022 REF. | |
| θ | 0° | 8° | 0° | 8° |