



| Parameter                               | Rating | Units |
|---|--------|-------|
| Drain-to-Source Voltage - $V_{(BR)DSX}$ | 400    | V     |
| Max On-Resistance - $R_{DS(on)}$        | 6      | Ω     |
| Max Power                               |        |       |
| SOT-89 Package                          | 1.1    | W     |
| SOT-223 Package                         | 2.5    |       |

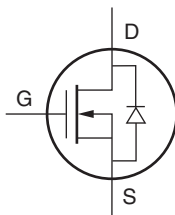
### Features

- 400V Drain-to-Source Voltage
- Depletion Mode Device Offers Low  $R_{DS(on)}$  at Cold Temperatures
- Low On-Resistance: 4.5Ω (Typical) @ 25°C
- Low  $V_{GS(off)}$  Voltage
- High Input Impedance
- Low Input and Output Leakage
- Small Package Size SOT-89 and SOT-223
- PC Card (PCMCIA) Compatible
- PCB Space and Cost Savings
- Flammability Rating UL 94 V-0

### Applications

- LED Drive Circuits
- Telecommunications
- Normally On Switches
- Ignition Modules
- Converters
- Security
- Power Supplies
- Regulators

### Circuit Symbol



### Description

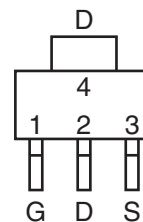
The CPC3909 is an N-channel, depletion mode Field Effect Transistor (FET) that is available in an SOT-223 package (CPC3909Z) and an SOT-89 package (CPC3909C). Both utilize IXYS Integrated Circuits Division's proprietary vertical DMOS process that realizes world class, high voltage MOSFET performance in an economical silicon gate process. The vertical DMOS process yields a highly reliable device, particularly for use in difficult application environments such as telecommunications, security, and power supplies.

CPC3909Z and the CPC3909C have a typical on-resistance of 4.5Ω and a drain-to-source voltage of 400V. As with all MOS devices, the FET structure prevents thermal runaway and thermally induced secondary breakdown.

### Ordering Information

| Part Number | Description                        |
|-------------|------------------------------------|
| CPC3909CTR  | SOT-89: Tape and Reel (1000/Reel)  |
| CPC3909ZTR  | SOT-223: Tape and Reel (1000/Reel) |

### Package Pinout:



| Pin Number | Name   |
|------------|--------|
| 1          | GATE   |
| 2          | DRAIN  |
| 3          | SOURCE |
| 4          | DRAIN  |



### Absolute Maximum Ratings @ 25°C

| Parameter                                 | Ratings     | Units |
|---|-------------|-------|
| Drain-to-Source Voltage ( $V_{(BR)DSX}$ ) | 400         | V     |
| Gate-to-Source Voltage ( $V_{GS}$ )       | 15          | V     |
| Total Package Dissipation <sup>1</sup>    |             |       |
| SOT-89                                    | 1.1         | W     |
| SOT-223                                   | 2.5         |       |
| Operational Temperature                   | -40 to +110 | °C    |
| Storage Temperature                       | -40 to +125 | °C    |

<sup>1</sup> Mounted on 1"x1" FR4 board.

*Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.*

*Typical values are characteristic of the device at +25°C, and are the result of engineering evaluations. They are provided for information purposes only, and are not part of the manufacturing testing requirements.*

### Electrical Characteristics @25°C (Unless Otherwise Specified)

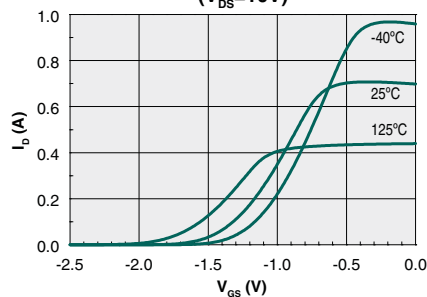
| Parameter                       | Symbol        | Conditions                  | Min  | Typ | Max  | Units    |
|---------------------------------|---------------|-----------------------------|------|-----|------|----------|
| Gate-to-Source Off Voltage      | $V_{GS(off)}$ | $I_D=1\mu A, V_{DS}=5V$     | -1.4 | -   | -3.1 | V        |
| Drain-to-Source Leakage Current | $I_{DS(off)}$ | $V_{GS}=-5.5V, V_{DS}=240V$ | -    | -   | 20   | nA       |
|                                 |               | $V_{GS}=-5.5V, V_{DS}=400V$ | -    | -   | 1    | $\mu A$  |
| Drain Current                   | $I_D$         | $V_{GS}=0V, V_{DS}=5V$      | 300  | -   | -    | mA       |
| On-Resistance                   | $R_{DS(on)}$  | $V_{GS}=0V, I_{DS}=300mA$   | -    | 4.5 | 6    | $\Omega$ |
| Gate Leakage Current            | $I_{GSS}$     | $V_{GS}=15V$                | -    | -   | 100  | nA       |
| Gate Capacitance                | $C_{ISS}$     | $V_{DS}=V_{GS}=0V$          | -    | -   | 275  | pF       |

### Thermal Impedance

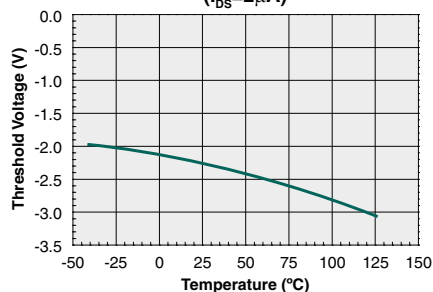
| Device             | Parameter           | Symbol        | Conditions | Min | Typ | Max | Units |
|--------------------|---------------------|---------------|------------|-----|-----|-----|-------|
| SOT-89 (CPC3909C)  | Junction to Case    | $\theta_{JC}$ | -          | -   | -   | 50  | °C/W  |
|                    | Junction to Ambient | $\theta_{JA}$ |            |     |     | 90  |       |
| SOT-223 (CPC3909Z) | Junction to Case    | $\theta_{JC}$ | -          | -   | -   | 14  |       |
|                    | Junction to Ambient | $\theta_{JA}$ |            |     |     | 55  |       |

# PERFORMANCE DATA\*

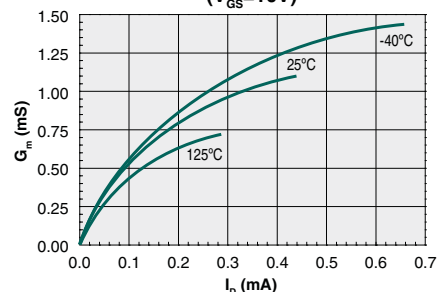
Instantaneous Transfer Characteristics  
( $V_{DS}=10V$ )



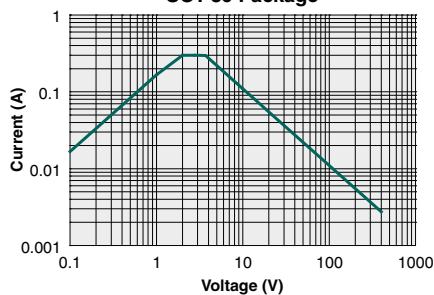
Threshold Voltage  
( $I_{DS}=2\mu A$ )



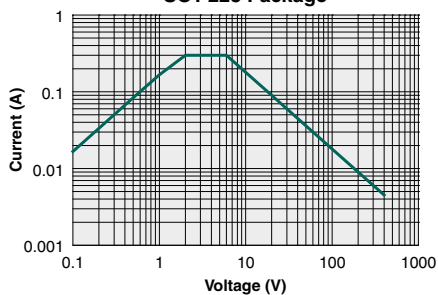
Transconductance vs. Drain Current  
( $V_{GS}=10V$ )



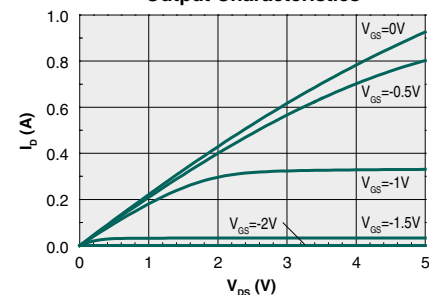
Forward Safe Operating Bias  
SOT-89 Package



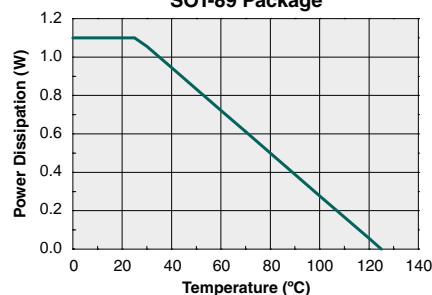
Forward Safe Operating Bias  
SOT-223 Package



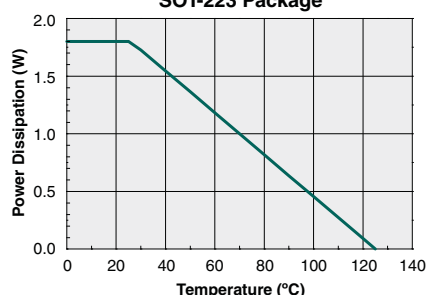
Output Characteristics



Power Dissipation  
vs. Ambient Temperature  
SOT-89 Package

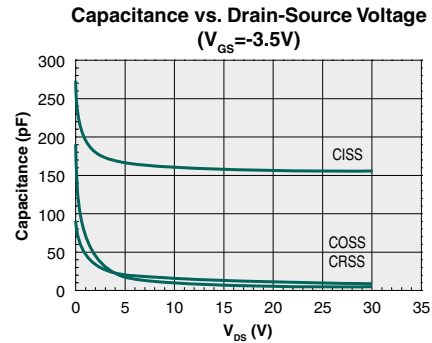
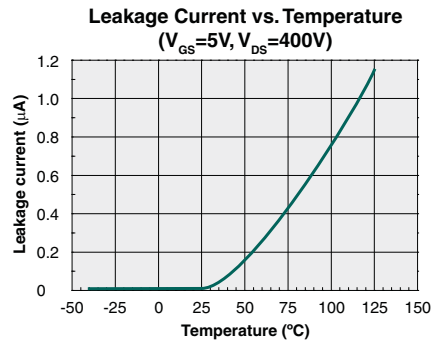
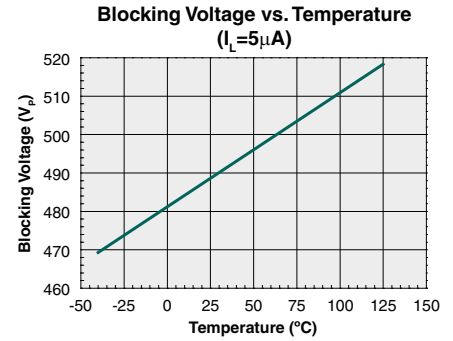
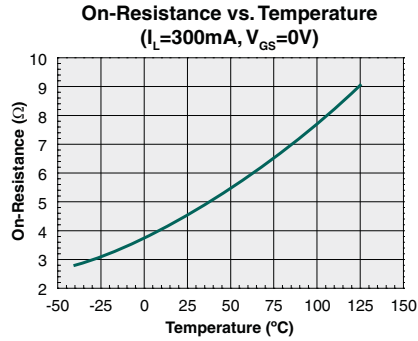
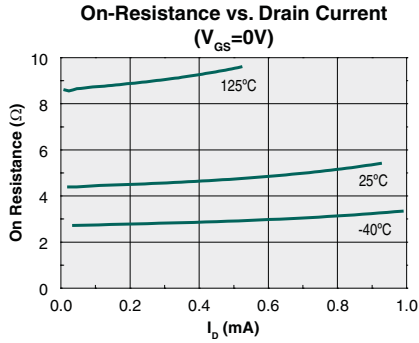


Power Dissipation  
vs. Ambient Temperature  
SOT-223 Package



\*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.

**PERFORMANCE DATA\***



\*Unless otherwise noted, data presented in these graphs is typical of device operation at 25°C.

## Manufacturing Information

### Moisture Sensitivity



All plastic encapsulated semiconductor packages are susceptible to moisture ingress. IXYS Integrated Circuits classifies its plastic encapsulated devices for moisture sensitivity according to the latest version of the joint industry standard, **IPC/JEDEC J-STD-020**, in force at the time of product evaluation. We test all of our products to the maximum conditions set forth in the standard, and guarantee proper operation of our devices when handled according to the limitations and information in that standard as well as to any limitations set forth in the information or standards referenced below.

Failure to adhere to the warnings or limitations as established by the listed specifications could result in reduced product performance, reduction of operable life, and/or reduction of overall reliability.

This product carries a **Moisture Sensitivity Level (MSL)** classification as shown below, and should be handled according to the requirements of the latest version of the joint industry standard **IPC/JEDEC J-STD-033**.

| Device              | Moisture Sensitivity Level (MSL) Classification |
|---------------------|---|
| CPC3909C / CPC3909Z | MSL 1   |

### ESD Sensitivity



This product is ESD Sensitive, and should be handled according to the industry standard **JESD-625**.

### Soldering Profile

Provided in the table below is the **IPC/JEDEC J-STD-020** Classification Temperature ( $T_C$ ) and the maximum dwell time the body temperature of these surface mount devices may be ( $T_C - 5$ )°C or greater. The Classification Temperature sets the Maximum Body Temperature allowed for these devices during reflow soldering processes.

| Device              | Classification Temperature ( $T_C$ ) | Dwell Time ( $t_p$ ) | Max Reflow Cycles |
|---------------------|--------------------------------------|----------------------|-------------------|
| CPC3909C / CPC3909Z | 260°C                                | 30 seconds           | 3                 |

### Board Wash

IXYS Integrated Circuits recommends the use of no-clean flux formulations. Board washing to reduce or remove flux residue following the solder reflow process is acceptable provided proper precautions are taken to prevent damage to the device. These precautions include but are not limited to: using a low pressure wash and providing a follow up bake cycle sufficient to remove any moisture trapped within the device due to the washing process. Due to the variability of the wash parameters used to clean the board, determination of the bake temperature and duration necessary to remove the moisture trapped within the package is the responsibility of the user (assembler). Cleaning or drying methods that employ ultrasonic energy may damage the device and should not be used. Additionally, the device must not be exposed to halide flux or solvents.

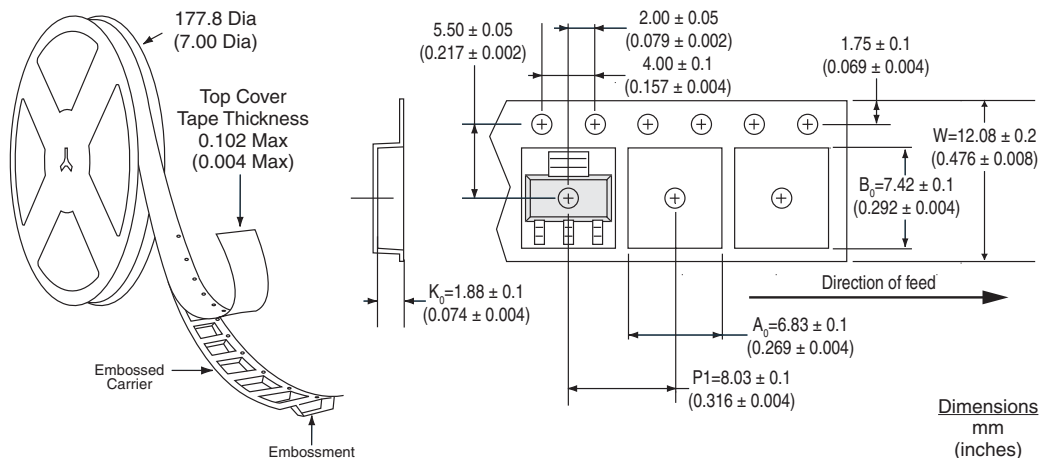


## CPC3909Z

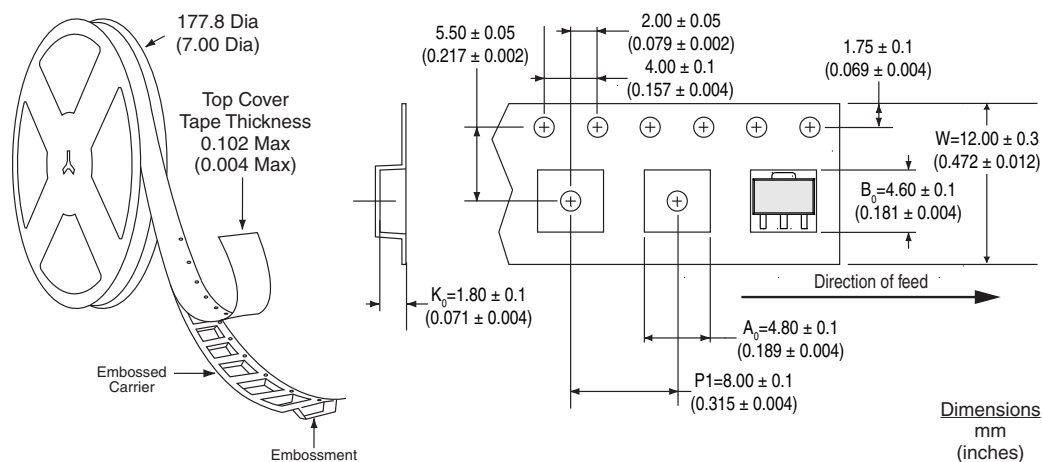


## MECHANICAL DIMENSIONS

### CPC3909ZTR Tape & Reel



### CPC3909CTR Tape & Reel



For additional information please visit our website at: [www.ixysic.com](http://www.ixysic.com)