IXYS
INTEGRATED CIRCUITS DIVISION



CPC3960
600V N-Channel Depletion-Mode FET

BV_{DSX}/ BV_{DGX}	$R_{DS(on)}$ (max)	I_{DSS} (min)	Package
600V	44Ω	100mA	SOT-223

Features
- High Breakdown Voltage: 600V
- On-Resistance: 44Ω max. at 25°C
- Low $V_{GS(off)}$ Voltage: -1.4 to -3.1V
- High Input Impedance
- Small Package Size: SOT-223

Applications
- Current Regulator
- Normally-On Switches
- Solid State Relays
- Converters
- Telecommunications
- Power Supply

Description
The CPC3960 is a 600V, N-channel, depletion-mode, Field Effect Transistor (FET) created using IXYS Integrated Circuits Division's proprietary vertical DMOS process. Yielding a robust device with high input impedance, this process enables world class, high voltage MOSFET performance with an economical silicon gate architecture.

As with all MOS devices, the FET structure prevents thermal runaway and thermal-induced secondary breakdown, which makes the CPC3960 ideal for use in high-power applications.

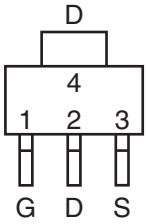
The CPC3960 is a highly reliable FET device that has been used extensively in IXYS Integrated Circuits Division's Solid State Relays for industrial and telecommunications applications.

The CPC3960 is available in the SOT-223 package.

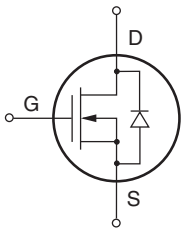
Ordering Information

Part #	Description
CPC3960ZTR	SOT-223: Tape and Reel (1000/Reel)

Package Pinout



Circuit Symbol



Absolute Maximum Ratings @ 25ºC

Parameter	Ratings	Units
Drain-to-Source Voltage	600	V
Gate-to-Source Voltage	±15	V
Pulsed Drain Current	150	mA
Total Package Dissipation [1]	1.8	W
Operational Temperature	-55 to +125	ºC
Junction Temperature, Maximum	+125	ºC
Storage Temperature	-55 to +125	ºC

[1] Mounted on 1"x1" 2 oz. Copper FR4 board.

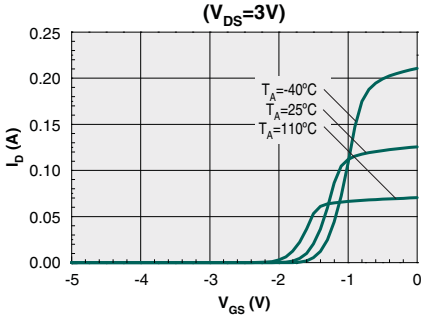
Absolute Maximum Ratings are stress ratings. Stresses in excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.

Electrical Characteristics @ 25ºC (Unless Otherwise Noted)

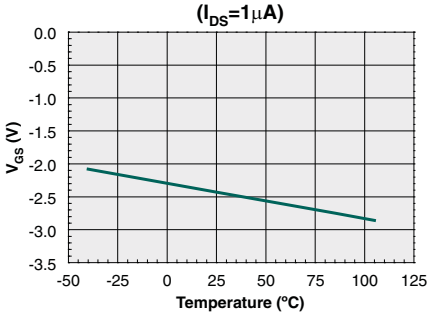
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-to-Source Breakdown Voltage	BV_{DSX}	V_{GS}= -5.5V, I_D=100µA	600	-	-	V
Gate-to-Source Off Voltage	$V_{GS(off)}$	V_{DS}= 15V, I_D=1µA	-1.4	-	-3.1	V
Change in $V_{GS(off)}$ with Temperature	$dV_{GS(off)}/dT$	V_{DS}= 15V, I_D=1µA	-	-	4.5	mV/ºC
Gate Body Leakage Current	I_{GSS}	V_{GS}=±15V, V_{DS}=0V	-	-	100	nA
Drain-to-Source Leakage Current	$I_{D(off)}$	V_{GS}= -5.5V, V_{DS}=600V	-	-	1	µA
Saturated Drain-to-Source Current	I_{DSS}	V_{GS}= 0V, V_{DS}=15V	100	-	-	mA
Static Drain-to-Source On-State Resistance	$R_{DS(on)}$	V_{GS}= 0V, I_D=100mA, V_{DS}=10V	-	-	44	Ω
Change in $R_{DS(on)}$ with Temperature	$dR_{DS(on)}/dT$		-	-	2.5	%/ºC
Forward Transconductance	G_{fs}	I_D= 50mA, V_{DS} = 10V	100	-	-	m℧
Input Capacitance	C_{ISS}	V_{GS}= -3.5V	-	100	-	pF
Common Source Output Capacitance	C_{OSS}	V_{DS}= 25V		6.8		
Reverse Transfer Capacitance	C_{RSS}	f= 1MHz		4.2		
Source-Drain Diode Voltage Drop	V_{SD}	V_{GS}= -5V, I_{SD}=150mA	-	0.72	1	V
Thermal Resistance						ºC/W
Junction to Ambient	Θ_{JA}	-	-	55	-	
Junction to Case	Θ_{JC}	-	-	23	-	

PERFORMANCE DATA @ 25ºC (Unless Otherwise Noted)*

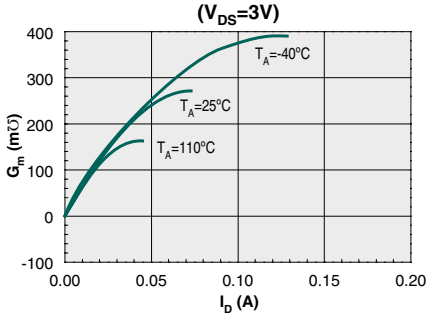
Input Admittance
(V_{DS}=3V)



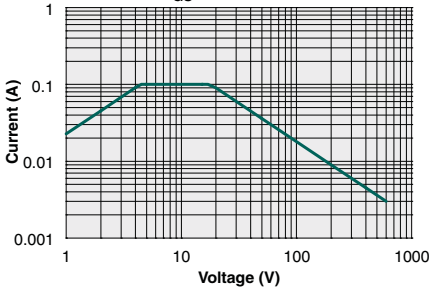
Threshold Voltage
(I_{DS}=1µA)



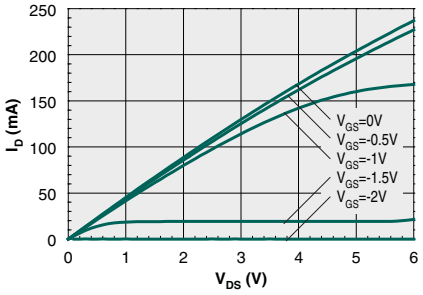
Transconductance vs. Drain Current
(V_{DS}=3V)



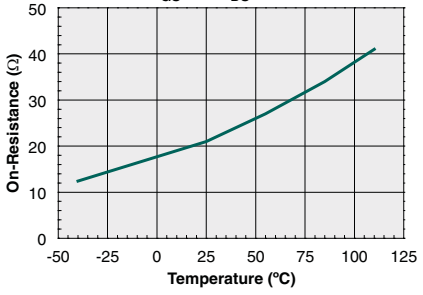
Forward Safe Operating Bias
(V_{GS}=0V, DC Load)



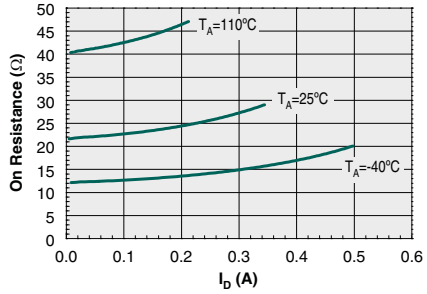
Output Characteristics



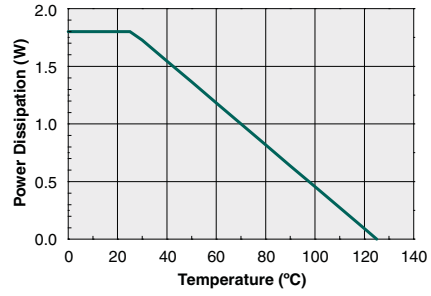
On-Resistance vs. Temperature
(V_{GS}=0V, I_{DS}=50mA)



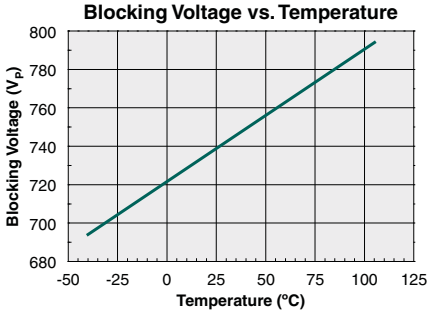
On-Resistance vs. Drain Current



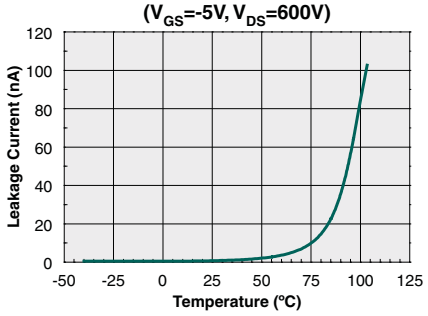
Power Dissipation
vs. Ambient Temperature



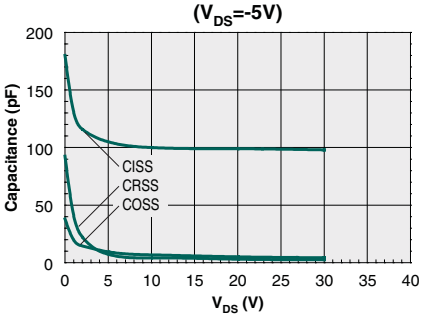
Blocking Voltage vs. Temperature



Leakage Current
(V_{GS}=-5V, V_{DS}=600V)



Capacitance vs. Drain-Source Voltage
(V_{DS}=-5V)



*The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

Manufacturing Information

Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingression. IXYS Integrated Circuits Division classified all of 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) rating** 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) Rating
CPC3960Z	MSL 1

ESD Sensitivity

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

Reflow Profile

This product has a maximum body temperature and time rating as shown below. All other guidelines of **J-STD-020** must be observed.

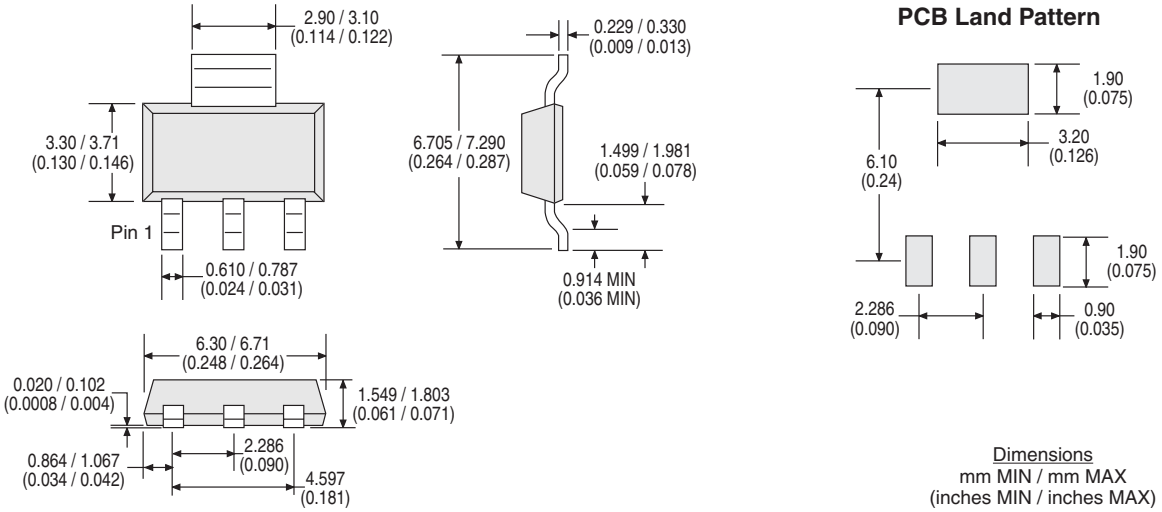
Device	Maximum Temperature x Time
CPC3960Z	260°C for 30 seconds

Board Wash

IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable, and the use of a short drying bake may be necessary. Chlorine-based or Fluorine-based solvents or fluxes should not be used. Cleaning methods that employ ultrasonic energy should not be used.

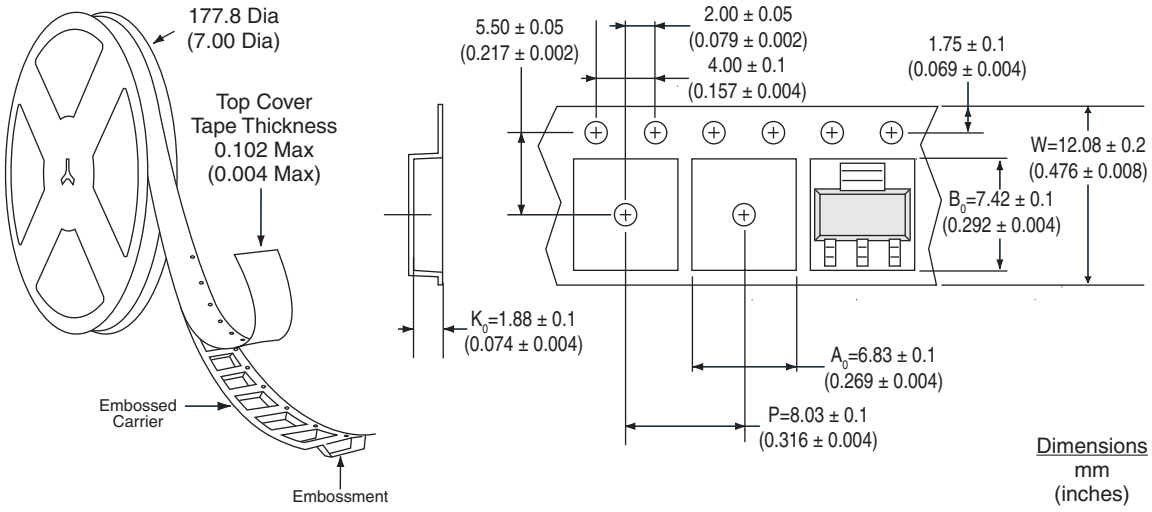
Mechanical Dimensions

CPC3960Z



Dimensions
mm MIN / mm MAX
(inches MIN / inches MAX)

CPC3960ZTR Tape & Reel



Dimensions
mm
(inches)

For additional information please visit our website at: www.ixysic.com

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Specification: DS-CPC3960-R02
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