

# CSM2333S23

## 12V P-Channel Enhancement Mode MOSFET

**Voltage**

**-12 V**

**Current**

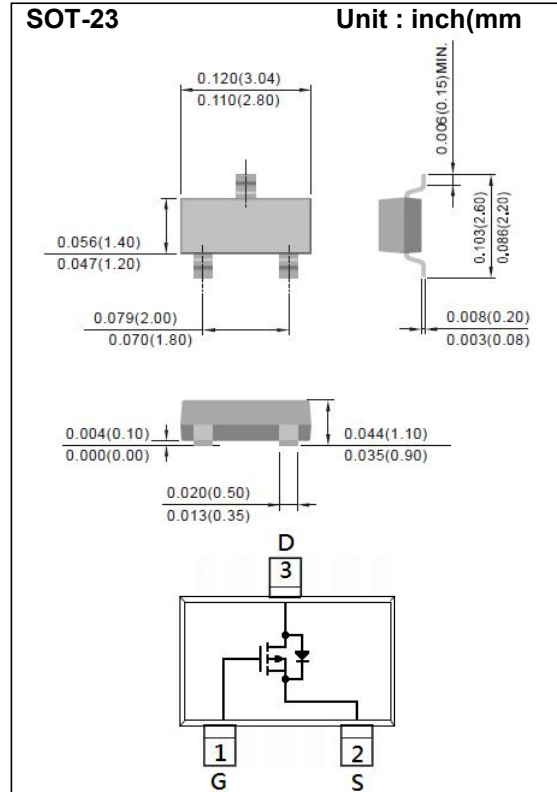
**-6A**

### Features

- $R_{DS(ON)}$ ,  $V_{GS}@-4.5V$ ,  $I_D@-6.0A < 30m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@-2.5V$ ,  $I_D@-5.0A < 39m\Omega$
- $R_{DS(ON)}$ ,  $V_{GS}@-1.8V$ ,  $I_D@-2.5A < 48m\Omega$
- Advanced Trench Process Technology
- High density cell design for ultra low on-resistance

### Mechanical Data

- Case: SOT-23 Package
- Terminals: Solderable per MIL-STD-750, Method 2026
- Approx. Weight: 0.0003 ounces, 0.0084 grams



### Maximum Ratings and Thermal Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNITS
Drain-Source Voltage		$V_{DS}$	-12	V
Gate-Source Voltage		$V_{GS}$	$\pm 12$	V
Continuous Drain Current		$I_D$	-6	A
Pulsed Drain Current		$I_{DM}$	-24	A
Power Dissipation	$T_a=25^\circ\text{C}$	$P_D$	2.8	W
	Derate above $25^\circ\text{C}$		22	mW/ $^\circ\text{C}$
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~150	$^\circ\text{C}$
Typical Thermal Resistance Junction to Ambient, $t < 10s$ (Note 3)		$R_{\theta JA}$	44.6	$^\circ\text{C/W}$

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## Electrical Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

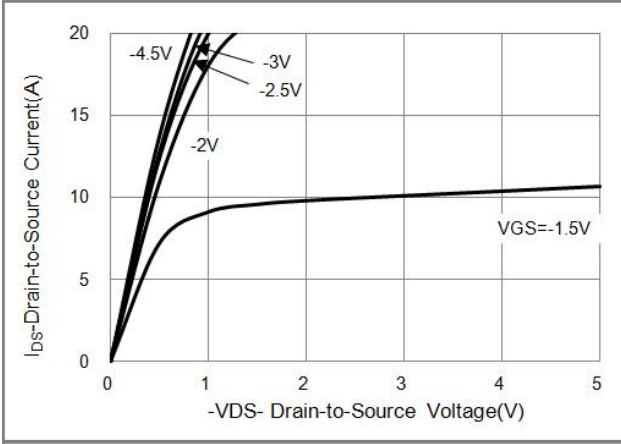
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
<b>Static</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-20	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.35	-0.6	-0.9	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-4.5V, I_D=-6.0A$	-	25	30	m $\Omega$
		$V_{GS}=-2.5V, I_D=-5.0A$	-	30	39	
		$V_{GS}=-1.8V, I_D=-2.5A$	-	35	48	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-12V, V_{GS}=0V$	-	-0.01	-1.0	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	$\pm 10$	$\pm 100$	nA
<b>Dynamic</b> (Note 6)						
Total Gate Charge	$Q_g$	$V_{DS}=-10V, I_D=-7.2A,$ $V_{GS}=-4.5V$ (Note 1,2)	-	18.9	-	nC
Gate-Source Charge	$Q_{gs}$		-	2.8	-	
Gate-Drain Charge	$Q_{gd}$		-	4.2	-	
Input Capacitance	$C_{iss}$	$V_{DS}=-10V, V_{GS}=0V,$ $f=1.0\text{MHz}$	-	1785	-	pF
Output Capacitance	$C_{oss}$		-	152	-	
Reverse Transfer Capacitance	$C_{rss}$		-	125	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=-10V, I_D=-7.2A,$ $V_{GEN}=-4.5V, R_L=10\Omega$ $R_G=6\Omega$ (Note 1,2)	-	12	-	ns
Turn-On Rise Time	$t_r$		-	68	-	
Turn-Off Delay Time	$t_{d(off)}$		-	82	-	
Turn-Off Fall Time	$t_f$		-	35	-	
<b>Drain-Source Diode</b>						
Maximum Continuous Drain-Source Diode Forward Current	$I_S$	---	-	-	-1.5	A
Diode Forward Voltage	$V_{SD}$	$I_S=-1A, V_{GS}=0V$	-	-0.64	-1.2	V

NOTES :

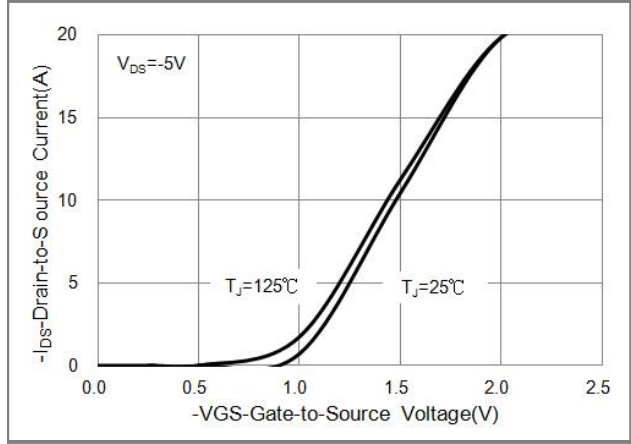
1. Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$
2. Essentially independent of operating temperature typical characteristics.
3. The maximum current rating is package limited.
4. Repetitive rating, pulse width limited by junction temperature  $T_J(\text{MAX})=150^\circ\text{C}$ . Ratings are based on low frequency and duty cycles to keep initial  $T_J=25^\circ\text{C}$ .
5.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. Mounted on a 1 inch<sup>2</sup> with 2oz. square pad of copper.
6. Guaranteed by design, not subject to production testing.

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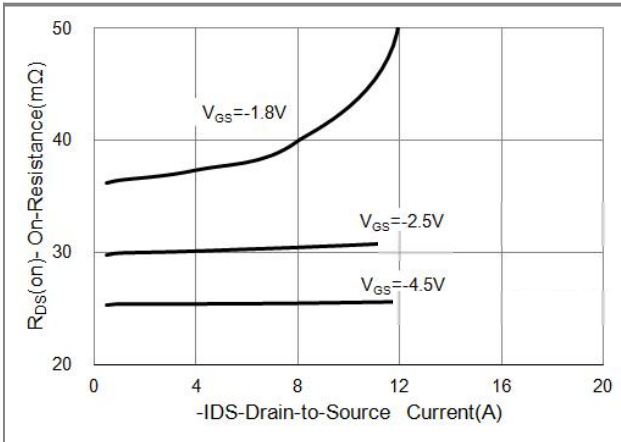
**TYPICAL CHARACTERISTIC CURVES**



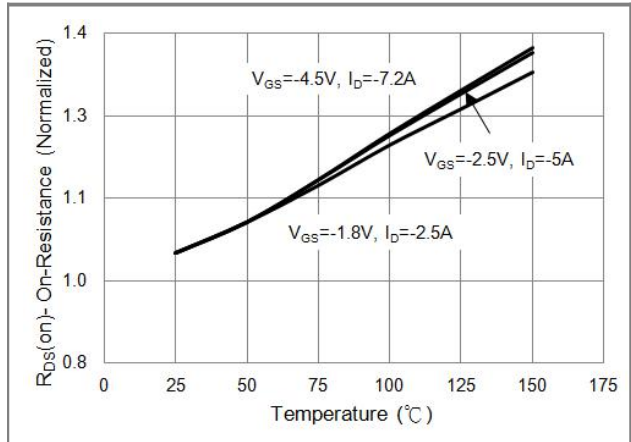
**Fig.1 On-Region Characteristics**



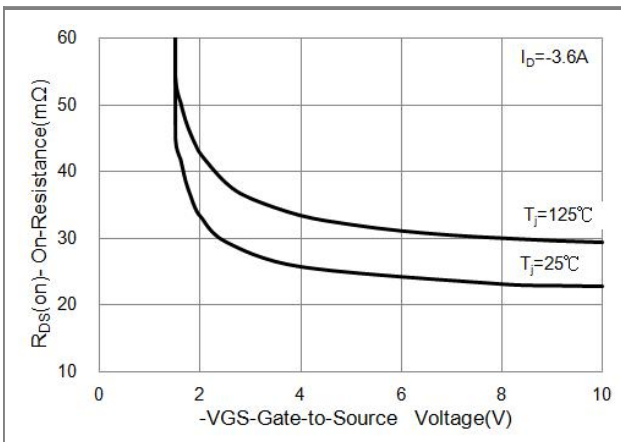
**Fig.2 Transfer Characteristics**



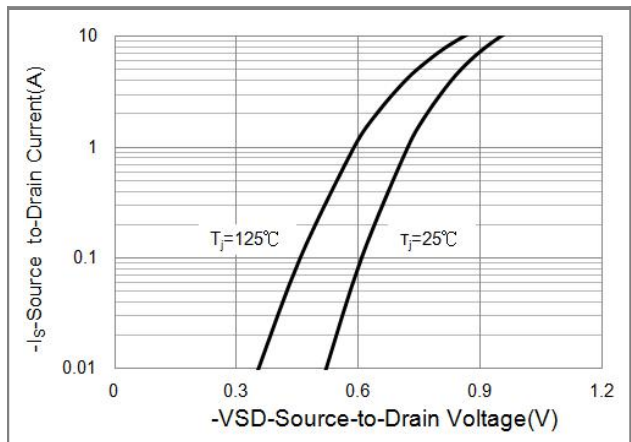
**Fig.3 On-Resistance vs. Drain Current**



**Fig.4 On-Resistance vs. Junction temperature**



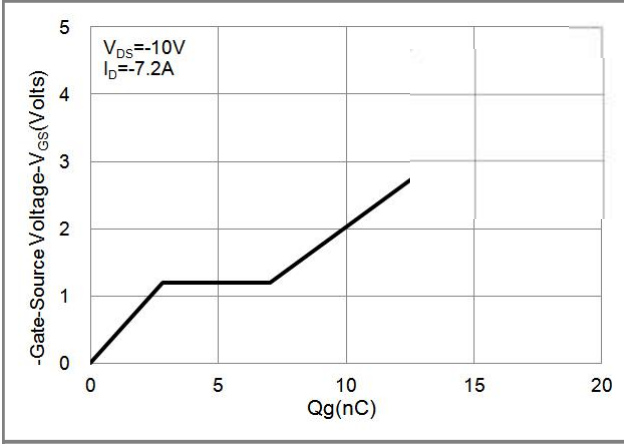
**Fig.5 On-Resistance Variation with VGS.**



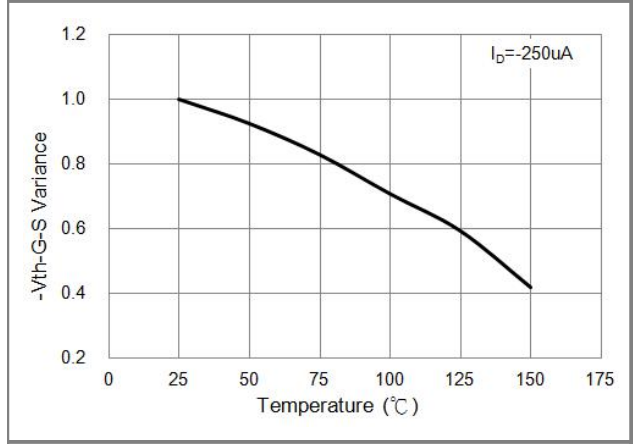
**Fig.6 Body Diode Characteristics**

**CSM2333S23**

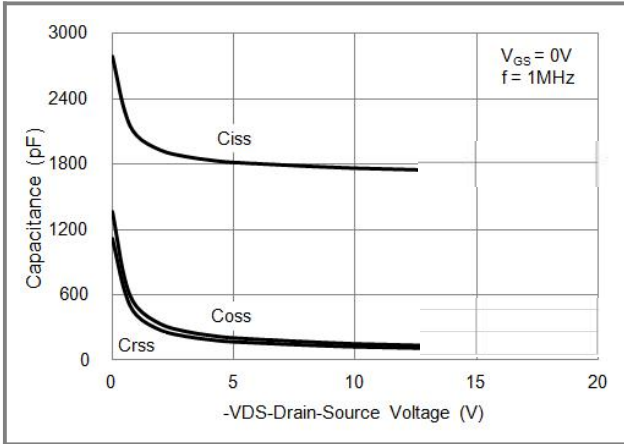
**TYPICAL CHARACTERISTIC CURVES**



**Fig.7 Gate-Charge Characteristics**



**Fig.8 Threshold Voltage Variation with Temperature.**



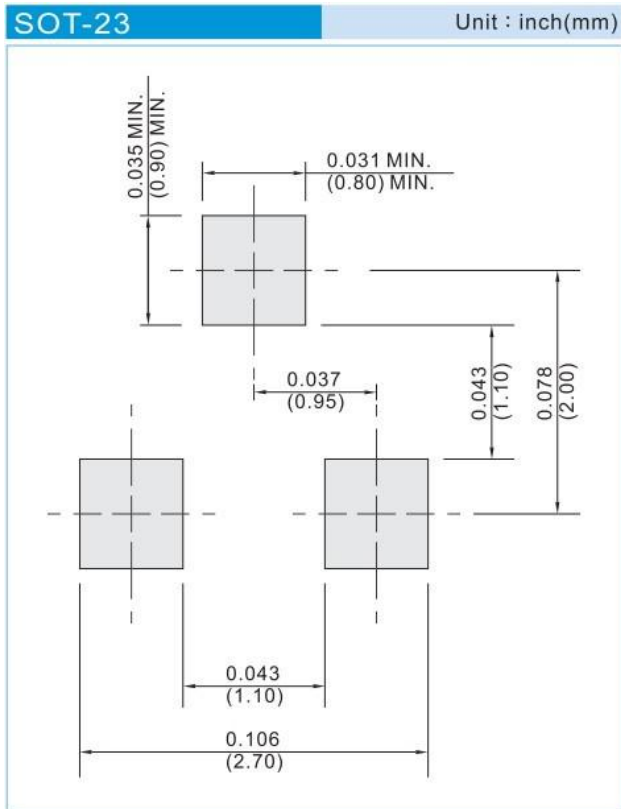
**Fig.9 Capacitance vs. Drain-Source Voltage.**

# CSM2333S23

## PART NO PACKING CODE VERSION

Part No Packing Code	Package Type	Packing Type
CSM2333S23	SOT-23	3K pcs / 7" reel

## MOUNTING PAD LAYOUT



## **CSM2333S23**

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