

## N-Channel Enhancement Mode Field Effect Transistor

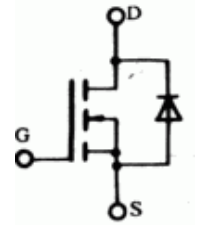
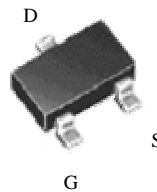
### FEATURES

- Super high dense cell design for low  $R_{DS(ON)}$
- Rugged and reliable
- Simple drive requirement
- SOT-23 package

PRODUCT SUMMARY		
$V_{DSS}$	$I_D$	$R_{DS(ON)}$ (m $\Omega$ ) Typ
20V	3.6A	65 @ $V_{GS}=4.5V$
		90 @ $V_{GS}=2.5V$



NOTE: The Si2302 is available in a lead-free package



### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 8$	V
Drain Current-Continuous <sup>a</sup> @ $T_j=125^\circ C$ - Pulse $d^b$	$I_D$	3.6	A
	$I_{DM}$	12	A
Drain-source Diode Forward Current <sup>a</sup>	$I_S$	1.25	A
Maximum Power Dissipation <sup>a</sup>	$P_D$	1.25	W
Operating Junction and Storage Temperature Range	$T_j, T_{STG}$	-55 to 150	$^\circ C$

### THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient <sup>a</sup>	$R_{th JA}$	100	$^\circ C/W$
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# Si2302

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	20			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =16V, V <sub>GS</sub> =0V			1	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±8V, V <sub>DS</sub> =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	0.5	0.8	1.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =2.8A		65	80	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =2.0A		90	110	
Forward Transconductance	g <sub>FS</sub>	V <sub>GS</sub> =5V, I <sub>D</sub> =5A		5		S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =10V, V <sub>GS</sub> =0V f=1.0MHz		586		pF
Output Capacitance	C <sub>OSS</sub>			101		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			59		pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =10V I <sub>D</sub> =3.6A, V <sub>GEN</sub> =4.5V R <sub>L</sub> =10ohm R <sub>GEN</sub> =10ohm		6.5		ns
Rise Time	t <sub>r</sub>			32.1		ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>			58.4		ns
Fall Time	t <sub>f</sub>			48		ns
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =1A V <sub>GS</sub> =4.5V		6		nC
Gate-Source Charge	Q <sub>gS</sub>			1.35		nC
Gate-Drain Charge	Q <sub>gD</sub>			1.5		nC

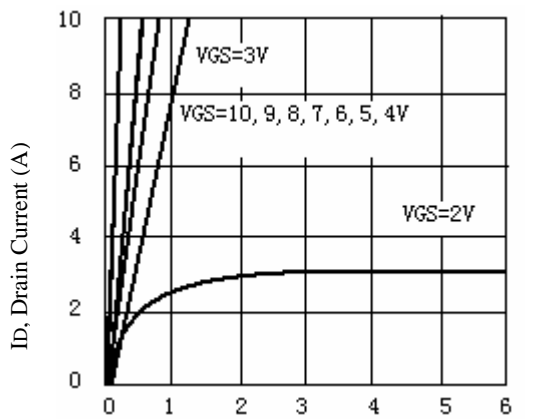
# Si2302

## ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

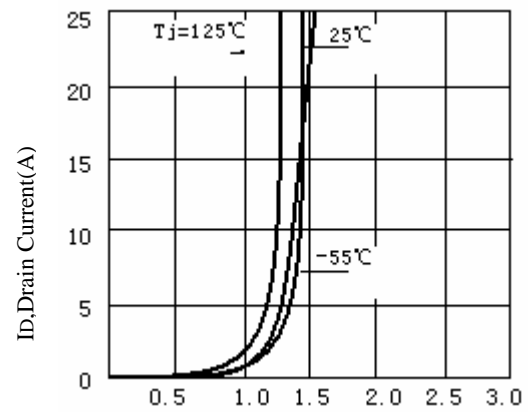
Parameter	Symbol	Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>Gs</sub> =0V, I <sub>s</sub> =1.25A		0.84	1.2	V

### Notes

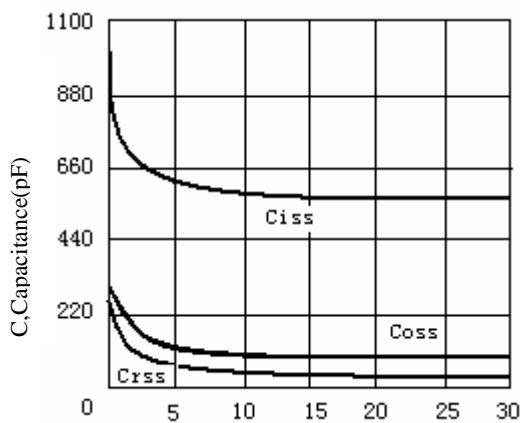
- Surface Mounted on FR4 Board,  $t \leq 10\text{sec}$
- Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty  $\leq 2\%$
- Guaranteed by design, not subject to production testing.



V<sub>DS</sub>, Drain-to-Source Voltage (V)  
Figure 1. Output Characteristics



V<sub>Gs</sub>, Gate-to-source Voltage (V)  
Figure 2. Transfer Characteristics



V<sub>Gs</sub>, Drain-to-Source Voltage  
Figure 3. Capacitance

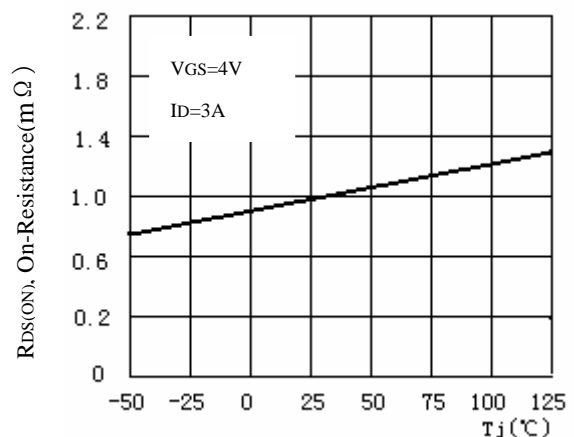
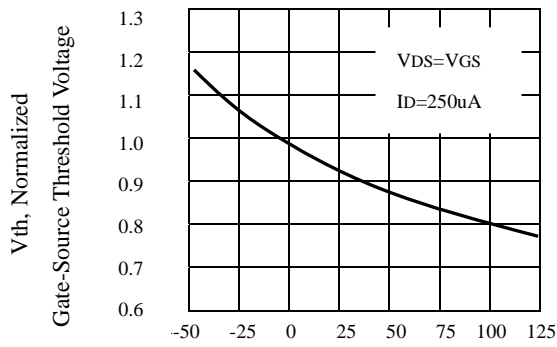
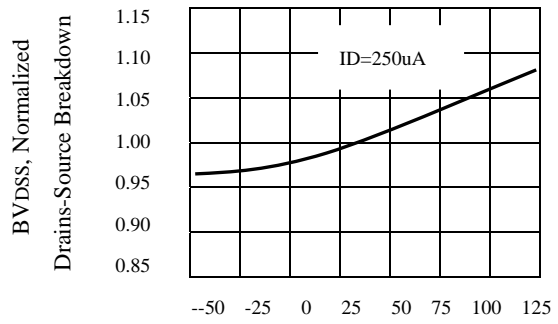


Figure 4. On-Resistance Variation with Temperature

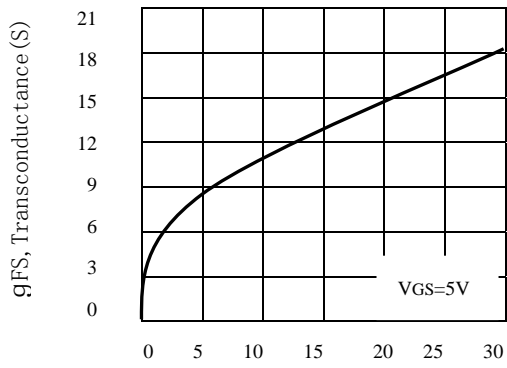
# Si2302



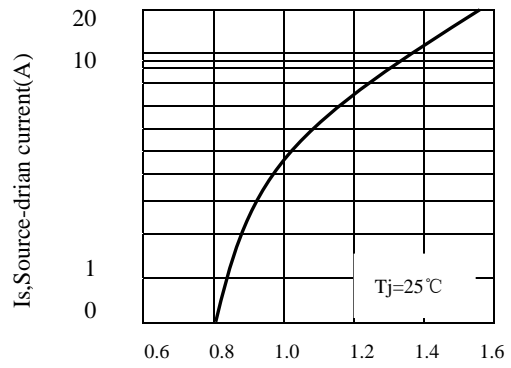
Tj, Junction Temperature(°C)  
Figure5.Gate Threshold Variation With Temperature



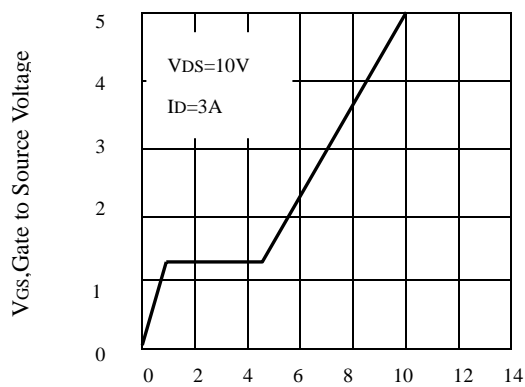
Tj, Junction Temperature (°C)  
Figure6.Breakdown Voltage Variation With Temperature



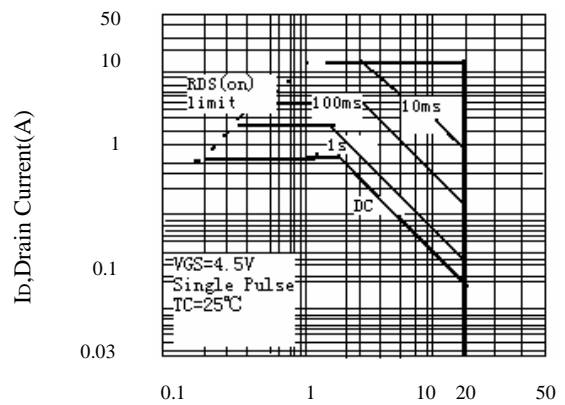
Ids, Drain-Source Current (A)  
Figure7.Transconductance Variation With Drain Current



VSD, Body Diode Forward Voltage  
Figure8.Body Diode Forward Voltage Variation with Source Current



Qg, Total Gate Charge (nC)  
Figure9. Gate Charge



VDS, Drain-Source Voltage(V)  
Figure10.Maximum Safe Operating Area