

N-Channel Enhancement Mode Field Effect Transistor

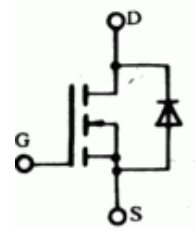
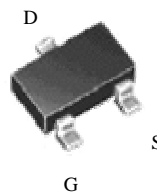
FEATURES

- 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 Ω) Typ
20V	3.6A	65 @ $V_{GS}=4.5V$
		90 @ $V_{GS}=2.5V$



NOTE: The Si2304 is available in a lead-free package



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

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

THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient ^a	$R_{th JA}$	100	$^\circ\text{C/W}$
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Si2304

ELECTRICAL CHARACTERISTICS (TA=25°C 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} =16V, V _{GS} =0V			1	μA
Gate-Body Leakage	I _{GSS}	V _{GS} =±8V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	0.5	0.8	1.5	V
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} =4.5V, I _D =2.8A		65	80	mΩ
		V _{GS} =2.5V, I _D =2.0A		90	110	
Forward Transconductance	g _{FS}	V _{GS} =5V, I _D =5A		5		S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =10V, V _{GS} =0V f=1.0MHz		586		pF
Output Capacitance	C _{OSS}			101		pF
Reverse Transfer Capacitance	C _{RSS}			59		pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{D(on)}	V _{DD} =10V I _D =3.6A, V _{GEN} =4.5V R _L =10ohm R _{GEN} =10ohm		6.5		ns
Rise Time	t _r			32.1		ns
Turn-Off Delay Time	t _{D(off)}			58.4		ns
Fall Time	t _f			48		ns
Total Gate Charge	Q _g	V _{DS} =10V, I _D =1A V _{GS} =4.5V		6		nC
Gate-Source Charge	Q _{gs}			1.35		nC
Gate-Drain Charge	Q _{gd}			1.5		nC

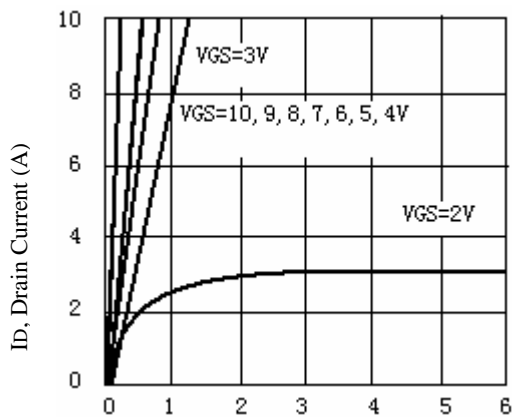
Si2304

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

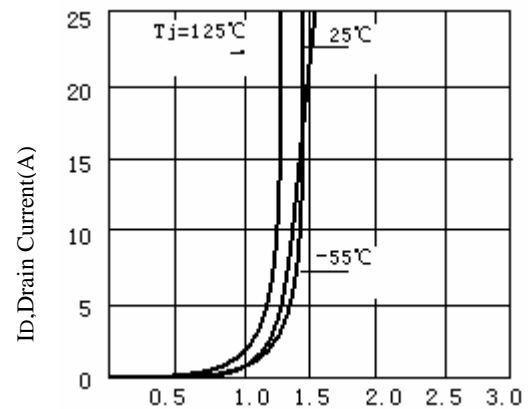
Parameter	Symbol	Condition	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =1.25A		0.84	1.2	V

Notes

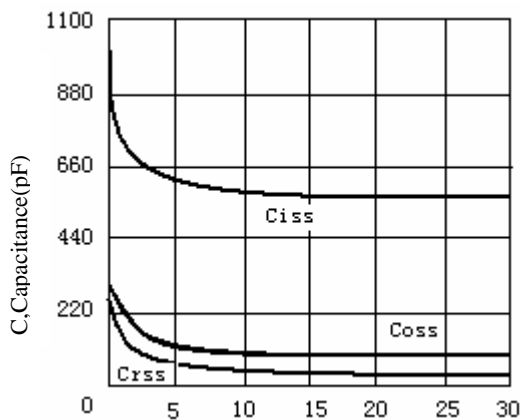
- Surface Mounted on FR4 Board, $t \leq 10\text{sec}$
- Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty $\leq 2\%$
- Guaranteed by design, not subject to production testing.



V_{DS}, Drain-to-Source Voltage (V)
Figure 1. Output Characteristics



V_{GS}, Gate-to-source Voltage (V)
Figure 2. Transfer Characteristics



V_{GS}, Drain-to Source Voltage
Figure 3. Capacitance

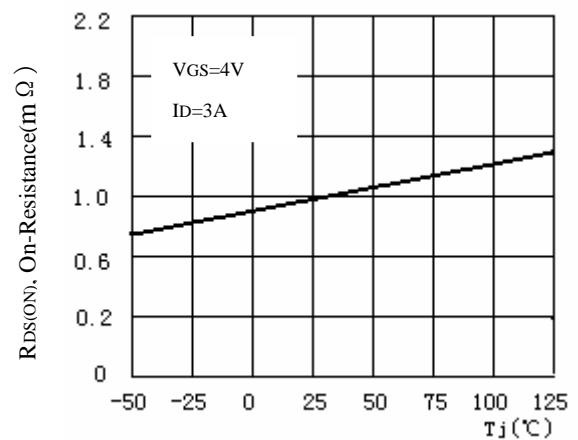
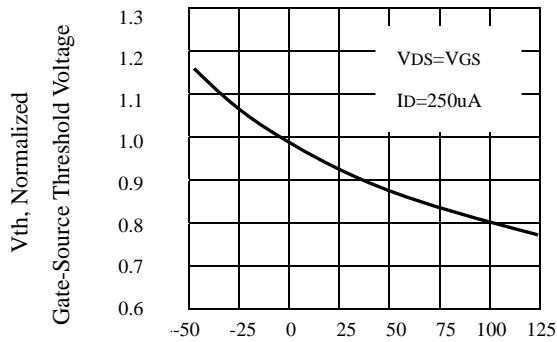
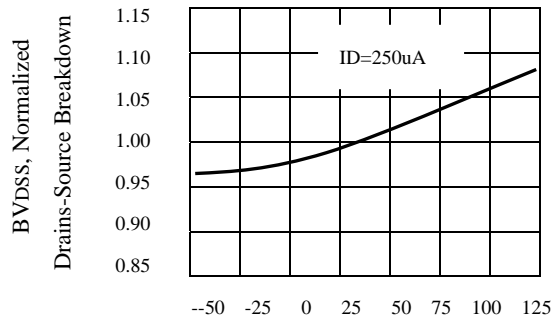


Figure 4. On-Resistance Variation with Temperature

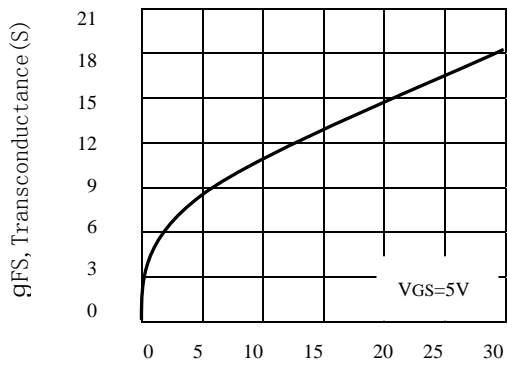
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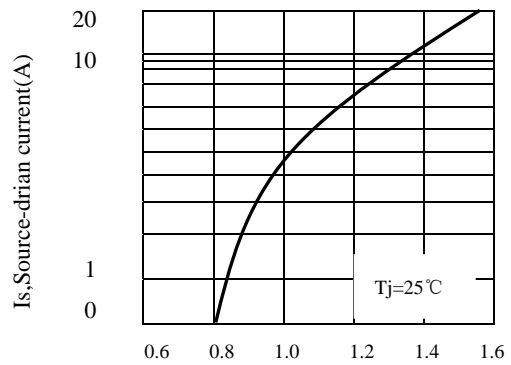
Tj, Junction Temperature(°C)
Figure5.Gate Threshold Variation With Temperature



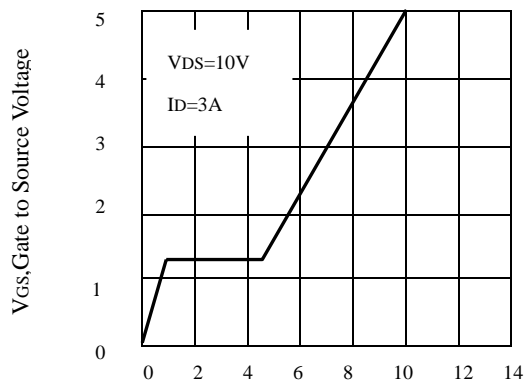
Tj, Junction Temperature (°C)
Figure6.Breakdown Voltage Variation With Temperature



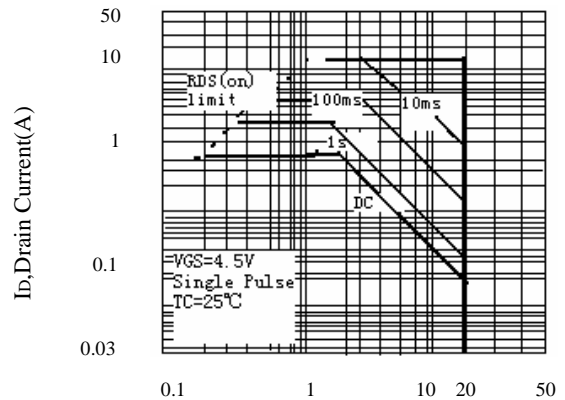
Ids, Drain-Source Current (A)
Figure7.Transconductance Variation With Drain Current



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