Dual N-Channel 2.5-V (G-S) MOSFET

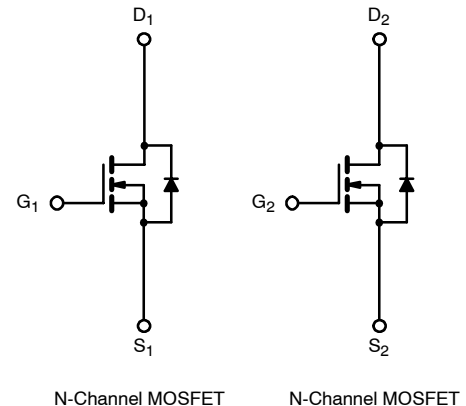**TrenchFET®**
Power MOSFETs
2.5-V Rated

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
20	0.075 @ V_{GS} = 4.5 V	±4.2
	0.134 @ V_{GS} = 2.5 V	±3.1

1206-8 ChipFET™

1

S_1
D_1 G_1
D_1 S_2
D_2 G_2
D_2

3.0 mm

1.8 mm

Bottom View
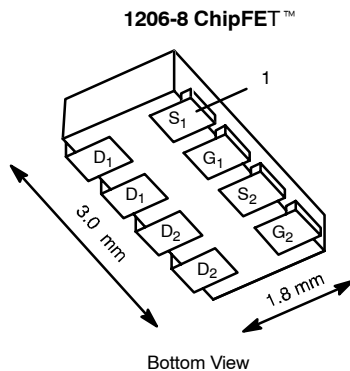
Marking Code

| CB | XX |

Lot Traceability and Date Code

Part # Code

D_1 D_2

G_1 G_2

S_1 S_2

N-Channel MOSFET   N-Channel MOSFET

Ordering Information: Si5904DC-T1

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)

Parameter		Symbol	5 secs	Steady State	Unit
Drain-Source Voltage		V_{DS}	20		V
Gate-Source Voltage		V_{GS}	±12		
Continuous Drain Current (T_J = 150°C)[a]	T_A = 25°C	I_D	±4.2	±3.1	A
	T_A = 85°C		±3.0	±2.2	
Pulsed Drain Current		I_{DM}	±10		
Continuous Source Current (Diode Conduction)[a]		I_S	1.8	0.9	
Maximum Power Dissipation[a]	T_A = 25°C	P_D	2.1	1.1	W
	T_A = 85°C		1.1	0.6	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 150		°C
Soldering Recommendations (Peak Temperature)[b, c]			260		

THERMAL RESISTANCE RATINGS

| Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient[a]	t ≤ 5 sec	R_{thJA}	50	60	°C/W
	Steady State		90	110	
Maximum Junction-to-Foot (Drain)	Steady State	R_{thJF}	30	40	

Notes
a. Surface Mounted on 1" x 1" FR4 Board.
b. See Reliability Manual for profile. The ChipFET is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
c. Rework Conditions: manual soldering with a soldering iron is not recommended for leadless components.

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SPECIFICATIONS (T$_J$ = 25°C UNLESS OTHERWISE NOTED)

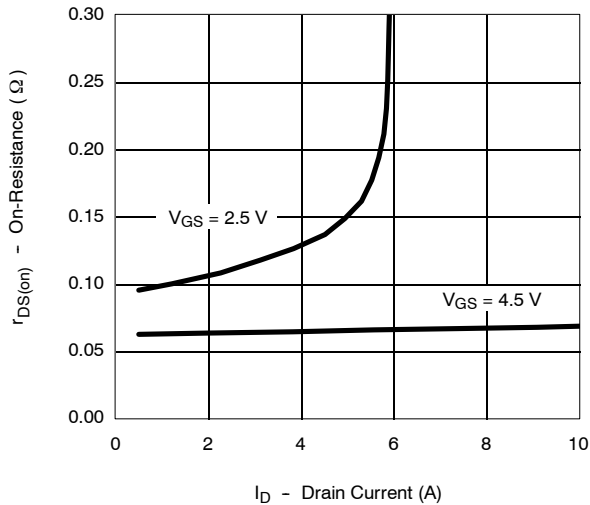| Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Gate Threshold Voltage	V$_{GS(th)}$	V$_{DS}$ = V$_{GS}$, I$_D$ = 250 µA	0.6			V
Gate-Body Leakage	I$_{GSS}$	V$_{DS}$ = 0 V, V$_{GS}$ = ±12 V			±100	nA
Zero Gate Voltage Drain Current	I$_{DSS}$	V$_{DS}$ = 16 V, V$_{GS}$ = 0 V			1	µA
		V$_{DS}$ = 16 V, V$_{GS}$ = 0 V, T$_J$ = 85°C			5	
On-State Drain Current[a]	I$_{D(on)}$	V$_{DS}$ ≥ 5 V, V$_{GS}$ = 4.5 V	10			A
Drain-Source On-State Resistance[a]	r$_{DS(on)}$	V$_{GS}$ = 4.5 V, I$_D$ = 3.1 A		0.065	0.075	Ω
		V$_{GS}$ = 2.5 V, I$_D$ = 2.3 A		0.115	0.143	
Forward Transconductance[a]	g$_{fs}$	V$_{DS}$ = 10 V, I$_D$ = 3.1 A		8		S
Diode Forward Voltage[a]	V$_{SD}$	I$_S$ = 0.9 A, V$_{GS}$ = 0 V		0.8	1.2	V
Dynamic[b]						
Total Gate Charge	Q$_g$	V$_{DS}$ = 10 V, V$_{GS}$ = 4.5 V, I$_D$ = 3.1 A		4	6	nC
Gate-Source Charge	Q$_{gs}$			0.6		
Gate-Drain Charge	Q$_{gd}$			1.3		
Turn-On Delay Time	t$_{d(on)}$	V$_{DD}$ = 10 V, R$_L$ = 10 Ω I$_D$ ≅ 1 A, V$_{GEN}$ = 4.5 V, R$_G$ = 6 Ω		12	18	ns
Rise Time	t$_r$			35	55	
Turn-Off Delay Time	t$_{d(off)}$			19	30	
Fall Time	t$_f$			9	15	
Source-Drain Reverse Recovery Time	t$_{rr}$	I$_F$ = 0.9 A, di/dt = 100 A/µs		40	80	

Notes
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

Output Characteristics
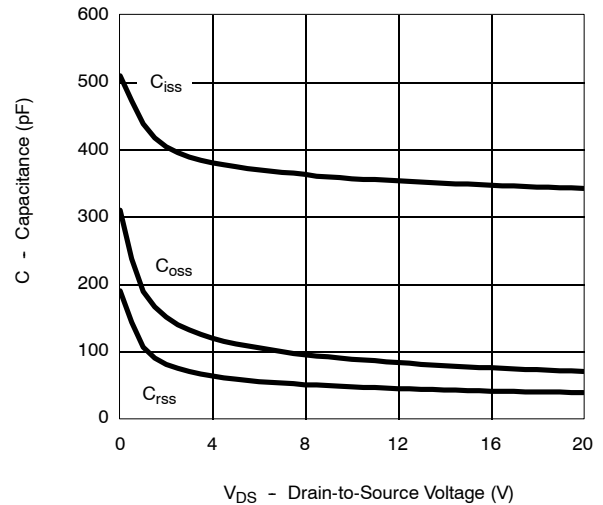
Transfer Characteristics
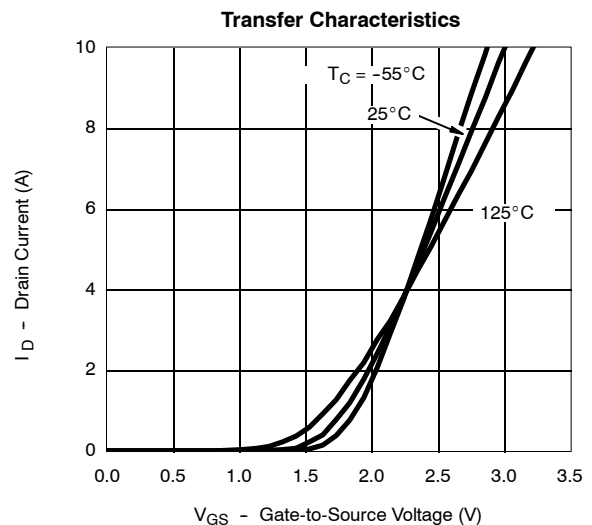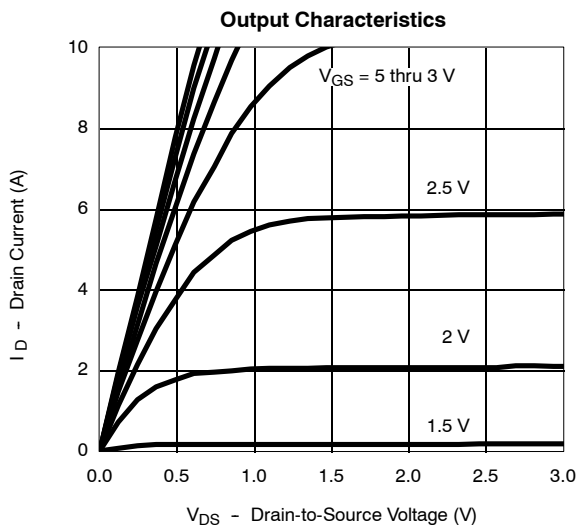
TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Drain Current

$V_{GS} = 2.5$ V

$V_{GS} = 4.5$ V

$r_{DS(on)}$ – On-Resistance (Ω)

I_D – Drain Current (A)

Capacitance

C_{iss}

C_{oss}

C_{rss}

C – Capacitance (pF)

V_{DS} – Drain-to-Source Voltage (V)

Gate Charge

$V_{DS} = 10$ V
$I_D = 3.1$ A

V_{GS} – Gate-to-Source Voltage (V)

Q_g – Total Gate Charge (nC)
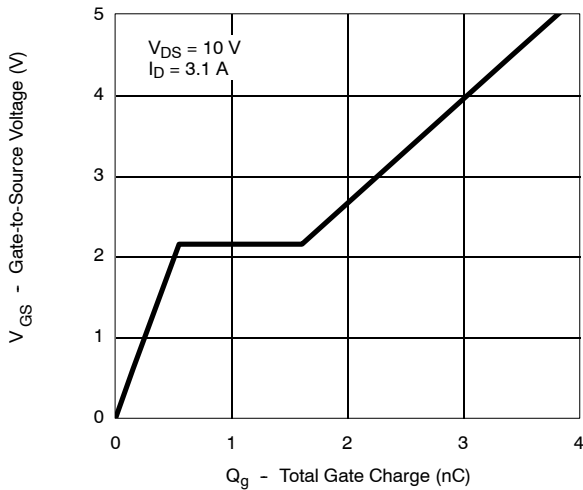
On-Resistance vs. Junction Temperature

$V_{GS} = 4.5$ V
$I_D = 3.1$ A

$r_{DS(on)}$ – On-Resistance (Ω)
(Normalized)

T_J – Junction Temperature (°C)
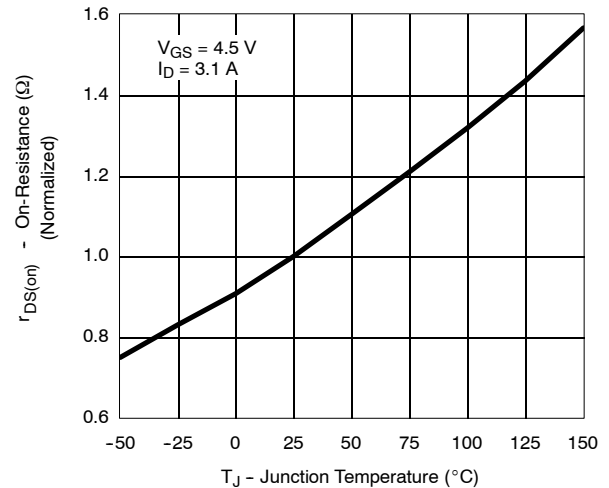
Source-Drain Diode Forward Voltage

$T_J = 150°C$

$T_J = 25°C$

I_S – Source Current (A)

V_{SD} – Source-to-Drain Voltage (V)
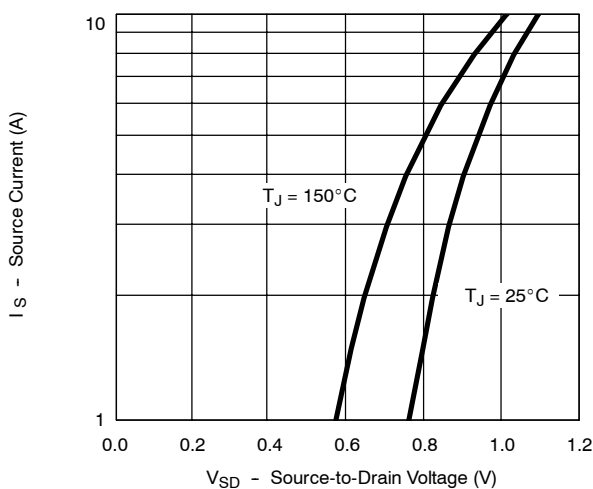
On-Resistance vs. Gate-to-Source Voltage

$I_D = 3.1$ A

$r_{DS(on)}$ – On-Resistance (Ω)

V_{GS} – Gate-to-Source Voltage (V)

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TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

Threshold Voltage

$I_D = 250 \, \mu A$

$V_{GS(th)}$ Variance (V)

T_J – Temperature (°C)

Single Pulse Power

Power (W)

Time (sec)

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Effective Transient Thermal Impedance

Duty Cycle = 0.5

0.2

0.1

0.05

0.02

Single Pulse

Notes:

P_{DM}

t_1

t_2

1. Duty Cycle, D = $\dfrac{t_1}{t_2}$

2. Per Unit Base = R_{thJA} = 90°C/W

3. $T_{JM} - T_A = P_{DM}Z_{thJA}{}^{(t)}$

4. Surface Mounted

1000

Square Wave Pulse Duration (sec)

Normalized Thermal Transient Impedance, Junction-to-Foot

Normalized Effective Transient Thermal Impedance

Duty Cycle = 0.5

0.2

0.1

0.05

0.02

Single Pulse

Square Wave Pulse Duration (sec)