



Dual P-Channel 1.8 V (G-S) MOSFET

PRODUCT SUMMARY					
V _{DS} (V)	$R_{DS(on)}(\Omega)$	I _D (A)	Q _g (Typ.)		
	0.542 at V _{GS} = - 4.5 V	- 0.63			
- 8	0.798 at V _{GS} = - 2.5 V	- 0.52	10.5 nC		
	1.2 at V _{GS} = - 1.8 V	- 0.20			

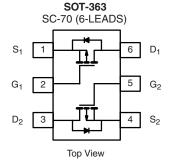
FEATURES

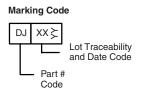
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFET
- Compliant to RoHS Directive 2002/95/EC



APPLICATIONS

· Load Switch for Portable Devices





Ordering Information: Si1905BDH-T1-E3 (Lead (Pb)-free)

Si1905BDH-T1-GE3 (Lead (Pb)-free and Halogen-free)

Parameter	Symbol	Limit	Unit		
Drain-Source Voltage		V _{DS}	- 8	.,	
Gate-Source Voltage		V _{GS}	± 8	V	
	T _C = 25 °C		- 0.63		
Out in the County (T	T _C = 70 °C		- 0.50		
Continuous Drain Current (T _J = 150 °C) ^{a, b}	T _A = 25 °C	I _D	- 0.58 ^{a, b}		
	T _A = 70 °C		- 0.47 ^{a, b}	А	
Pulsed Drain Current (10 µs Pulse Width)		I _{DM}	- 1.8		
a ii a a a a a a	T _C = 25 °C	1	- 0.30		
Continuous Source-Drain Diode Current ^{a, b}	T _A = 25 °C	I _S	- 0.25 ^{a, b}		
	T _C = 25 °C		0.357		
	T _C = 70 °C	В	0.228		
Maximum Power Dissipation ^{a, b}	T _A = 25 °C	P _D	0.301 ^{a, b}	W	
	T _A = 70 °C		0.193 ^{a, b}	7	
Operating Junction and Storage Temperature Ran	T _J , T _{stg}	- 55 to 150			
Soldering Recommendations (Peak Temperature)		260	°C		

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
Marrian una lumation ta Analaianta C	t ≤ 5 s	R _{thJA}	360	415	°C/W	
Maximum Junction-to-Ambient ^{a, c}	Steady State		400	460		
Maximum Junction-to-Foot (Drain)	Steady State	R _{thJF}	300	350		

Notes:

a. Surface mounted on 1" x 1" FR4 board.

b. t = 5 s.

c. Maximum under steady state conditions is 400 °C/W.

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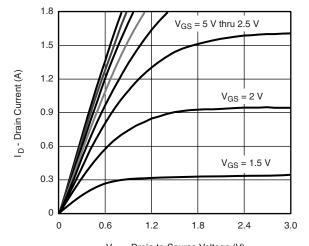
Parameter Symbol Test Conditions Min. Typ. Max. Unit Static	SPECIFICATIONS T _J = 25 °C, unless otherwise noted								
Drain-Source Breakdown Voltage V _{DS} V _{QS} = 0 V, I _D = -250 μA -8 V V _{DS} Temperature Coefficient ΔV _{DS} (T _J)				Min.	Тур.	Max.	Unit		
V _{DS} Temperature Coefficient ΔV _{DS} /T _J I _D = -250 μA 7.15 mV/F V _{GS(th)} Temperature Coefficient ΔV _{GS(th)} V _{DS} = V _{GS} , I _D = -250 μA -0.45 -1.06 -1.00 V Gate-Source Threshold Voltage I _{GSS} V _{DS} = V _{CS} , I _D = -250 μA -0.45 -1.00 V Gate-Source Leakage I _{GSS} V _{DS} = V _{CS} , I _D = -250 μA -0.45 -1.00 rA Zero Gate Voltage Drain Current I _{DSS} V _{DS} = 8 V, V _{GS} = 0 V, T _J = 55 °C -1.0 rA On-State Drain Current ^a I _{D(on)} V _{DS} = 5 V, V _{GS} = 0 V, T _J = 55 °C -1.8 -1.0 A On-State Drain Current ^a I _{D(on)} V _{DS} = 5 V, V _{GS} = 0 V, T _J = 55 °C -1.8 A A Drain-Source On-State Resistance ^a P _{DS} (oh) V _{DS} = -4 V, V _{GS} = 0 V, T _J = 50.8A 0.450 0.542 A A Drain-Source Conscitance C _{Css} V _{DS} = -4 V, V _{DS} = 0.2A 0.950 1.2 S Dynamic ^b Input Capacitance C _{Css} C _{Css} 1.0 1.5 A P </td <td>Static</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Static								
Vos(th) Temperature Coefficient AV _{GS(th)}	Drain-Source Breakdown Voltage	V _{DS}	$V_{GS} = 0 \text{ V}, I_D = -250 \mu\text{A}$	- 8			V		
Vase(p) Temperature Coefficient λ/V _{GS(ph}) V _{DS} = V _{GS} , I _D = -250 μA - 0.45 - 1.06 - 1.00 V Gate-Source Leakage I _{GSS} V _{DS} = 0 V, V _{GS} = -8 V - 0.45 - 1.00 nA Zero Gate Voltage Drain Current I _{DSS} V _{DS} = -8 V, V _{GS} = 0 V - 1.8 - 1.0 nA On-State Drain Current ⁸ I _{D(on)} V _{DS} = 8 V, V _{GS} = 0 V, T _J = 55 °C - 1.8 A Drain-Source On-State Resistance ⁸ I _{D(on)} V _{DS} = -8 V, V _{GS} = 0 V, T _J = 55 °C - 1.8 A Proward Transconductance ⁸ I _{D(on)} V _{DS} = -8 V, V _{GS} = 0 V, T _J = 55 °C 0.450 0.542 Poramic-Source On-State Resistance ⁸ I _{D(on)} V _{DS} = -8 V, V _{GS} = 0 V, T _J = 55 °C 0.450 0.542 Poramic-Source Con-State Resistance ⁸ I _{D(S(on)} V _{DS} = -4 V, V _{DS} = -0.47 A 0.655 0.798 Ω Poramic-Source Con-State Resistance I _{D(S(on)} V _{DS} = -4 V, V _{DS} = 0.58 A 1.2 S Dynamic-Source Grant Contracter Capacitance C _{ISS} V _{DS} = -4 V, V _{DS} = 0.7 f = 1 MHz 30 p Gate-Source Charge<	V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$	L = 250 uA		7.15		mV/°C		
	V _{GS(th)} Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	1 _D = - 250 μA		- 1.66				
	Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_{D} = -250 \mu\text{A}$	- 0.45		- 1.0	V		
	Gate-Source Leakage		V _{DS} = 0 V, V _{GS} = -8 V			- 100	nA		
On-State Drain Current ^a I _{D(on)} V _{DS} = -8 V, V _{QS} = 0 V, T _J = 55 °C -10 A Drain-Source On-State Resistance ^a I _{D(on)} V _{DS} = -4.5 V, I _D = -0.58 A 0.450 0.542 Drain-Source On-State Resistance ^a R _{DS(on)} V _{GS} = -4.5 V, I _D = -0.58 A 0.655 0.798 Ω Forward Transconductance ^a g _{IS} V _{DS} = -4 V, I _D = -0.24 A 0.950 1.2 S Dynamic ^b Input Capacitance C _{Iss} V _{DS} = -4 V, I _D = -0.58 A 1.2 S Dutput Capacitance C _{Iss} V _{DS} = -4 V, V _{GS} = 0 V, f = 1 MHz 30 pF Reverse Transfer Capacitance C _{Iss} V _{DS} = -4 V, V _{GS} = 0 V, f = 1 MHz 30 pF Gate-Source Charge Q _g 0.10 1.5 nC Gate-Brain Charge Q _g 0.20 0.20 nC Gate Resistance R _g f = 1 MHz 6.3 Ω Ω Turn-On Delay Time t _q V _D = -4 V, R _L = 8.7 Ω 40 60 90 </td <td>7 0 1 1/1 5 1 0 1</td> <td rowspan="2">I_{DSS}</td> <td>V_{DS} = -8 V, V_{GS} = 0 V</td> <td></td> <td></td> <td>- 1</td> <td colspan="2" rowspan="2">μA</td>	7 0 1 1/1 5 1 0 1	I _{DSS}	V _{DS} = -8 V, V _{GS} = 0 V			- 1	μA		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Zero Gate Voltage Drain Current		V _{DS} = - 8 V, V _{GS} = 0 V, T _J = 55 °C			- 10			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	On-State Drain Current ^a	I _{D(on)}	$V_{DS} \le 5 \text{ V}, V_{GS} = -4.5 \text{ V}$	- 1.8			Α		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			V _{GS} = - 4.5 V, I _D = - 0.58 A		0.450	0.542	Ω		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 2.5 V, I _D = - 0.47 A		0.655	0.798			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$, ,	V _{GS} = - 1.8 V, I _D = - 0.2 A		0.950	1.2			
$ \begin{array}{ c c c c c c c c } \hline \text{Input Capacitance} & C_{\text{iss}} \\ \hline \text{Output Capacitance} & C_{\text{oss}} \\ \hline \text{Reverse Transfer Capacitance} & C_{\text{rss}} \\ \hline \hline \text{Reverse Transfer Capacitance} & C_{\text{rss}} \\ \hline \hline \text{Total Gate Charge} & Q_g \\ \hline \text{Gate-Source Charge} & Q_{gs} \\ \hline \text{Gate-Drain Charge} & Q_{gd} \\ \hline \text{Gate-Drain MHz} & G.3 \\ \hline \text{O.20} \\ \hline \text{Turn-On Delay Time} & t_{gd} \\ \hline \text{Ups - 4 V, R_L = 8.7 } \Omega \\ \hline \text{V}_{DD} = -4 \text{ V, R}_L = 8.7 } \Omega \\ \hline \text{V}_{DD} = -4 \text{ V, R}_L = 8.7 } \Omega \\ \hline \text{V}_{DD} = -4 \text{ V, R}_L = 8.7 } \Omega \\ \hline \text{V}_{DD} = -4 \text{ V, R}_L = 8.7 } \Omega \\ \hline \text{Drain-Source Body Diode Characteristics} \\ \hline \\ \hline \textbf{Drain-Source Body Diode Characteristics} \\ \hline \\ \hline \textbf{Continuous Source-Drain Diode Current} & I_S \\ \hline \text{Continuous Source-Drain Diode Current} & I_S \\ \hline \text{Drain-Source Body Diode Characteristics} \\ \hline \\ \hline \textbf{Pale Diode Forward Current} & I_{SM} \\ \hline \text{Drain-Source Recovery Time} & I_{T} \\ \hline \text{Body Diode Reverse Recovery Charge} & Q_{rr} \\ \hline \\ \hline \text{Reverse Recovery Fall Time} & I_{t} \\ \hline Reverse Recovery Fal$	Forward Transconductance ^a	9 _{fs}	V _{DS} = - 4 V, I _D = - 0.58 A		1.2		S		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Dynamic ^b	·			•	'	,		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Input Capacitance	C _{iss}			62		pF		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Output Capacitance	C _{oss}	V _{DS} = - 4 V, V _{GS} = 0 V, f = 1 MHz		30				
Gate-Source Charge Q_{gs} $V_{DS} = -4 \text{ V}, V_{GS} = -4.5 \text{ V}, I_{D} = -0.58 \text{ A}$ 0.19 nC Gate-Drain Charge Q_{gd} 0.20 0.20 0.20 Gate Resistance R_g $f = 1 \text{ MHz}$ 6.3 Ω Turn-On Delay Time $t_{d(on)}$ $V_{DD} = -4 \text{ V}, R_L = 8.7 \Omega$ 40 60 Turn-Off Delay Time t_f $V_{DD} = -4 \text{ V}, R_L = 8.7 \Omega$ 40 60 Fall Time t_f t_f 50 75 Fall Time t_f t_f t_f t_f Drain-Source Body Diode Characteristics Continuous Source-Drain Diode Current t_g <t< td=""><td>Reverse Transfer Capacitance</td><td></td><td></td><td></td><td>12</td><td></td></t<>	Reverse Transfer Capacitance				12				
	Total Gate Charge	Q_g	V _{DS} = - 4 V, V _{GS} = - 4.5 V, I _D = - 0.58 A		1.0	1.5	nC		
	Gate-Source Charge	Q _{gs}			0.19				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Gate-Drain Charge				0.20				
Rise Time $t_{d(off)}$ Turn-Off Delay Time $t_{d(off)}$ Fall Time t_{f} $V_{DD} = -4 \text{ V}, \text{ R}_{L} = 8.7 \Omega$ $I_{D} \approx -0.46 \text{ A}, \text{ V}_{GEN} = -4.5 \text{ V}, \text{ R}_{g} = 1 \Omega$ $Drain-Source Body Diode Characteristics$ $Continuous Source-Drain Diode Current Is T_{C} = 25 ^{\circ}C$ $Pulse Diode Forward Current Is T_{SM}$ $Body Diode Voltage Voltage V_{SD}$ $End V_{SD}$	Gate Resistance	R _q	f = 1 MHz		6.3		Ω		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Turn-On Delay Time	t _{d(on)}			9	14			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Rise Time		$V_{DD} = -4 \text{ V, R}_{1} = 8.7 \Omega$		40	60	ns		
Fall Time $ t_f = 0.0000000000000000000000000000000000$	Turn-Off Delay Time	t _{d(off)}			50	75			
	Fall Time				60	90			
Pulse Diode Forward Current I_{SM} -1.8 Body Diode Voltage V_{SD} $I_S = -1.4 \text{ A}, V_{GS} = 0 \text{ V}$ -0.8 -1.2 V Body Diode Reverse Recovery Time t_{rr} Body Diode Reverse Recovery Charge Q_{rr} Reverse Recovery Fall Time t_a $I_F = -1.4 \text{ A}, dI/dt = 100 \text{ A}/\mu\text{s}, T_J = 25 ^{\circ}\text{C}$ 0 0 0 0 0 0 0	Drain-Source Body Diode Characterist								
Pulse Diode Forward Current I_{SM} -1.8 Body Diode Voltage V_{SD} $I_S = -1.4 \text{ A}, V_{GS} = 0 \text{ V}$ -0.8 -1.2 V Body Diode Reverse Recovery Time t_{rr} Body Diode Reverse Recovery Charge Q_{rr} Reverse Recovery Fall Time t_a $I_F = -1.4 \text{ A}, dI/dt = 100 \text{ A/µs}, T_J = 25 ^{\circ}\text{C}$ $I_F = -1.4 \text{ A}, dI/dt = 100 \text{ A/µs}, T_J = 25 ^{\circ}\text{C}$ $I_F = -1.4 \text{ A}, dI/dt = 100 \text{ A/µs}, T_J = 25 ^{\circ}\text{C}$	Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			- 0.30	A		
Body Diode Voltage V_{SD} $I_S=-1.4$ A, $V_{GS}=0$ V -0.8 -1.2 V Body Diode Reverse Recovery Time t_{rr} Body Diode Reverse Recovery Charge Q_{rr} Reverse Recovery Fall Time t_a $I_F=-1.4$ A, $dI/dt=100$ A/ μ s, $T_J=25$ °C 9 ns	Pulse Diode Forward Current	I _{SM}				- 1.8			
Body Diode Reverse Recovery Time t_{rr} Body Diode Reverse Recovery Charge Q_{rr} Reverse Recovery Fall Time t_a	Body Diode Voltage		I _S = - 1.4 A, V _{GS} = 0 V		- 0.8	- 1.2	V		
Reverse Recovery Fall Time t _a I _F = -1.4 A, dl/dt = 100 A/μs, I _J = 25 °C 9 ns					25	38	ns		
Reverse Recovery Fall Time t _a I _F = -1.4 A, dl/dt = 100 A/μs, I _J = 25 °C 9 ns	Body Diode Reverse Recovery Charge		1		7	11	nC		
ns			I _F = - 1.4 A, dl/dt = 100 A/μs, T _J = 25 °C		9		ns		
	Reverse Recovery Rise Time	t _b			16				

- a. Pulse test; pulse width $\leq 300~\mu s,$ duty cycle $\leq 2~\%.$
- b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

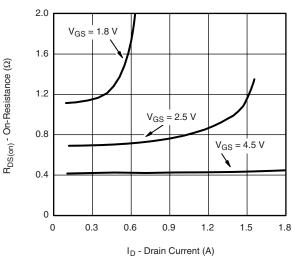


TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

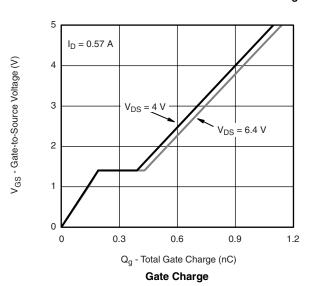


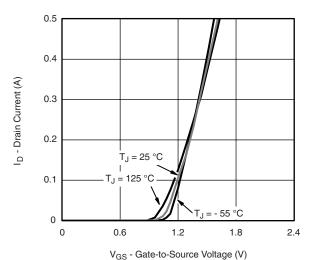
 $V_{\mbox{\footnotesize{DS}}}$ - Drain-to-Source Voltage (V)

Output Characteristics

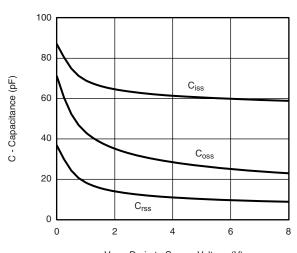


On-Resistance vs. Drain Current and Gate Voltage



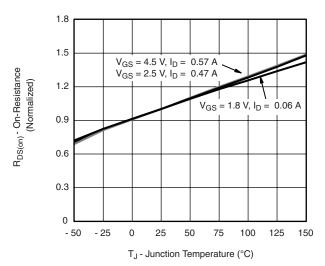


Transfer Characteristics



 $V_{\mbox{\footnotesize DS}}$ - Drain-to-Source Voltage (V)

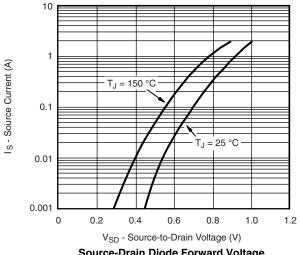
Capacitance

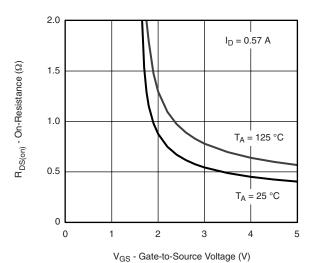


On-Resistance vs. Junction Temperature

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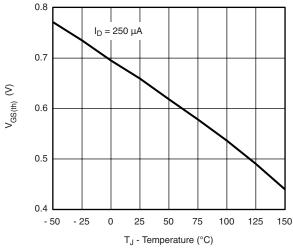
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

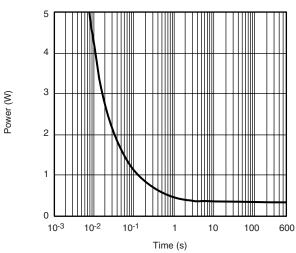




Source-Drain Diode Forward Voltage

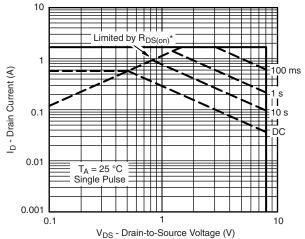






Threshold Voltage

Single Pulse Power, Junction-to-Ambient



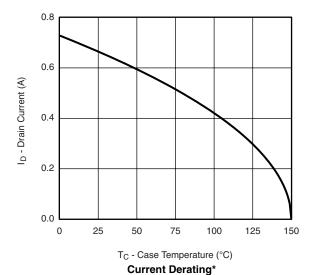
* V_{GS} > minimum V_{GS} at which R_{DS(on)} is specified

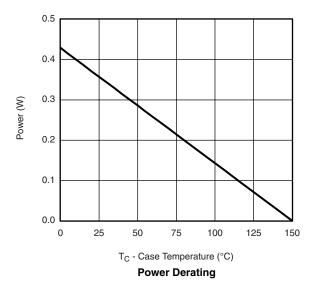
Safe Operating Area, Junction-to-Ambient





TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



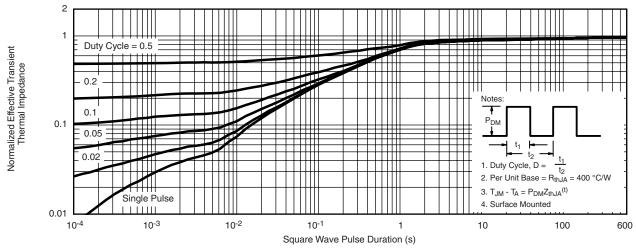


^{*} The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

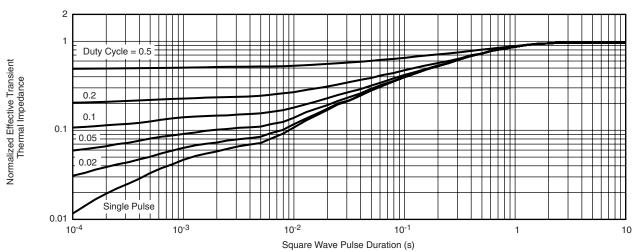
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TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

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