



**ALPHA & OMEGA**  
SEMICONDUCTOR

**AO4708**

**N-Channel Enhancement Mode Field Effect Transistor**

**SRFET™**



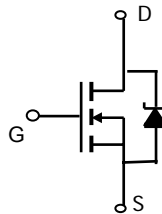
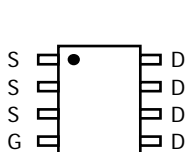
**General Description**

**SRFET™** AO4708 uses advanced trench technology with a monolithically integrated Schottky diode to provide excellent  $R_{DS(ON)}$ , and low gate charge. This device is suitable for use as a low side FET in SMPS, load switching and general purpose applications. *Standard Product AO4708 is Pb-free (meets ROHS & Sony 259 specifications). AO4708L is a Green Product ordering option. AO4708L and AO4708 are electrically identical.*

**Features**

- $V_{DS}$  (V) = 30V
- $I_D$  = 15A ( $V_{GS}$  = 10V)
- $R_{DS(ON)} < 8.7m\Omega$  ( $V_{GS}$  = 10V)
- $R_{DS(ON)} < 10.5m\Omega$  ( $V_{GS}$  = 4.5V)

**UIS TESTED!**  
**Rg, Ciss, Coss, Crss Tested**



**SRFET™**  
**Soft Recovery MOSFET:**  
**Integrated Schottky Diode**

**Absolute Maximum Ratings  $T_A=25^\circ\text{C}$  unless otherwise noted**

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current <sup>A</sup>	$I_{DSM}$	$T_A=25^\circ\text{C}$	15
		$T_A=70^\circ\text{C}$	12
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	80	A
Avalanche Current <sup>B</sup>	$I_{AR}$	25	A
Repetitive avalanche energy $L=0.3\text{mH}$ <sup>B</sup>	$E_{AR}$	94	mJ
Power Dissipation <sup>A</sup>	$P_{DSM}$	$T_A=25^\circ\text{C}$	3.1
		$T_A=70^\circ\text{C}$	2.0
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient <sup>A</sup>	$R_{\theta JA}$	$t \leq 10\text{s}$	32	$^\circ\text{C/W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady-State	60	$^\circ\text{C/W}$
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	17	24	$^\circ\text{C/W}$

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>STATIC PARAMETERS</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$I_D=250\mu\text{A}$ , $V_{GS}=0\text{V}$	30			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}$ , $V_{GS}=0\text{V}$ $T_J=125^\circ\text{C}$			0.1	mA
					20	
$I_{GSS}$	Gate-Body leakage current	$V_{DS}=0\text{V}$ , $V_{GS}=\pm 12\text{V}$			0.1	$\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=250\mu\text{A}$	1.4	1.8	2.4	V
$I_{D(ON)}$	On state drain current	$V_{GS}=4.5\text{V}$ , $V_{DS}=5\text{V}$	80			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10\text{V}$ , $I_D=15\text{A}$ $T_J=125^\circ\text{C}$		7.2	8.7	m $\Omega$
				10.5	13.1	
		$V_{GS}=4.5\text{V}$ , $I_D=14\text{A}$		8.6	10.5	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS}=5\text{V}$ , $I_D=15\text{A}$		85		S
$V_{SD}$	Diode Forward Voltage	$I_S=1\text{A}$ , $V_{GS}=0\text{V}$		0.39	0.5	V
$I_S$	Maximum Body-Diode + Schottky Continuous Current				5.5	A
<b>DYNAMIC PARAMETERS</b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0\text{V}$ , $V_{DS}=15\text{V}$ , $f=1\text{MHz}$		2800	3360	pF
$C_{oss}$	Output Capacitance			390		pF
$C_{rss}$	Reverse Transfer Capacitance			145		pF
$R_g$	Gate resistance	$V_{GS}=0\text{V}$ , $V_{DS}=0\text{V}$ , $f=1\text{MHz}$		0.8	1.5	$\Omega$
<b>SWITCHING PARAMETERS</b>						
$Q_g(10\text{V})$	Total Gate Charge	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $I_D=15\text{A}$		42	52	nC
$Q_g(4.5\text{V})$	Total Gate Charge			19		nC
$Q_{gs}$	Gate Source Charge			7		nC
$Q_{gd}$	Gate Drain Charge			6		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS}=10\text{V}$ , $V_{DS}=15\text{V}$ , $R_L=1\Omega$ , $R_{GEN}=3\Omega$		7		ns
$t_r$	Turn-On Rise Time			7		ns
$t_{D(off)}$	Turn-Off Delay Time			31		ns
$t_f$	Turn-Off Fall Time			5		ns
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=15\text{A}$ , $dI/dt=300\text{A}/\mu\text{s}$		13	15	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F=15\text{A}$ , $dI/dt=300\text{A}/\mu\text{s}$		12		nC

A: The value of  $R_{\theta JA}$  is measured with the device in a still air environment with  $T_A=25^\circ\text{C}$ . The power dissipation  $P_{DSM}$  and current rating  $I_{DSM}$  are based on  $T_{J(MAX)}=150^\circ\text{C}$ , using  $t \leq 10\text{s}$  junction-to-ambient thermal resistance.

B: Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)}=150^\circ\text{C}$ .

C: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

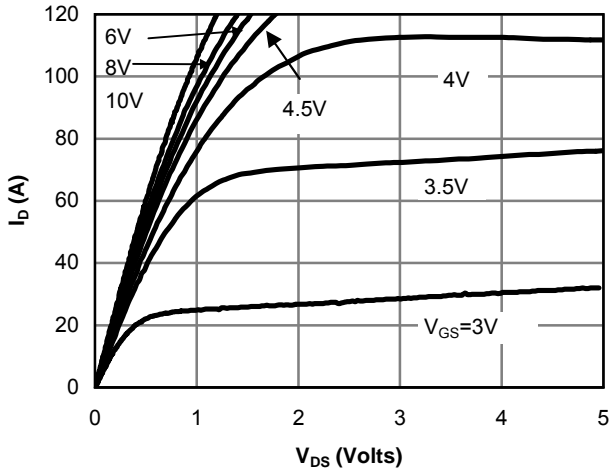
D: The static characteristics in Figures 1 to 6 are obtained using  $<300\mu\text{s}$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ . The SOA curve provides a single pulse rating.

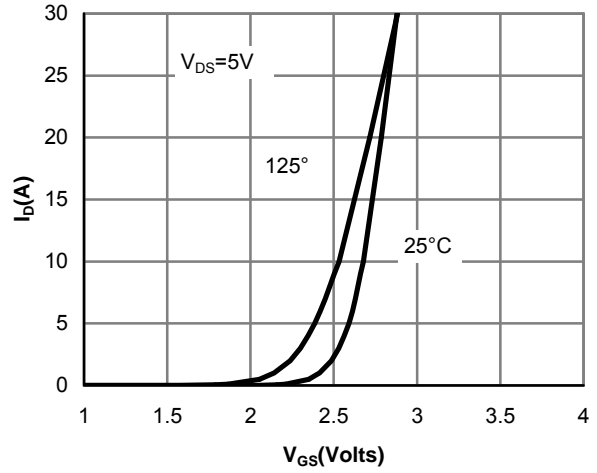
Rev0: Sept. 2006

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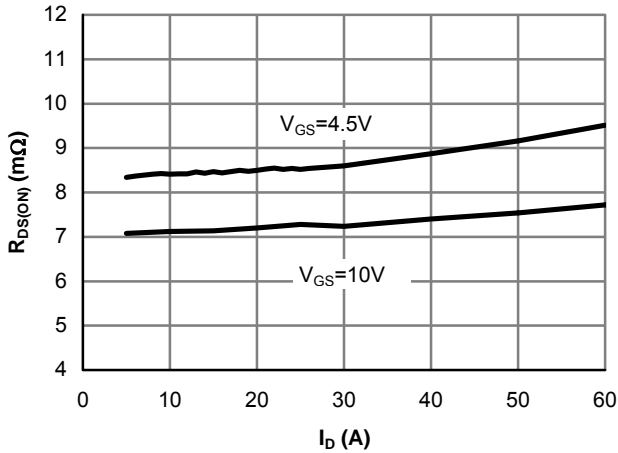
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



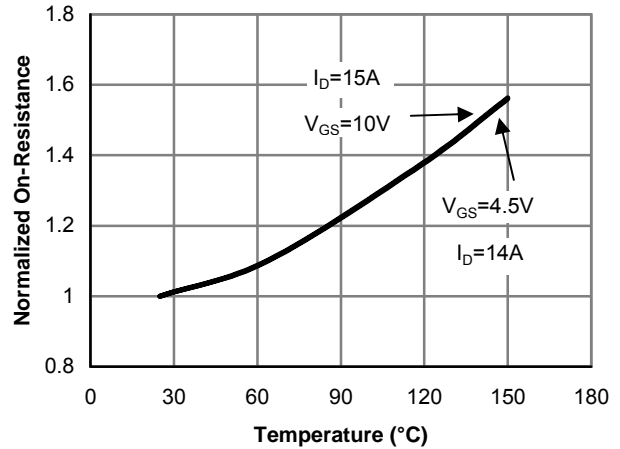
**Figure 1: On-Region Characteristics**



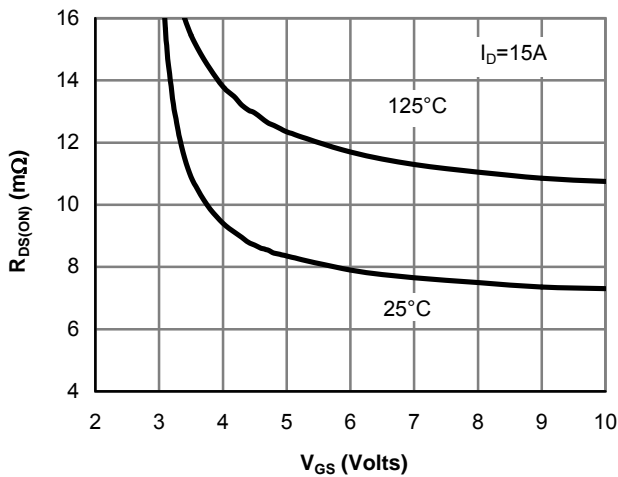
**Figure 2: Transfer Characteristics**



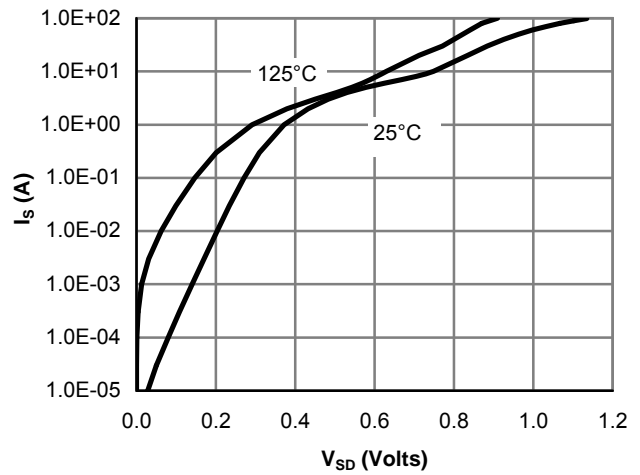
**Figure 3: On-Resistance vs. Drain Current and Gate Voltage**



**Figure 4: On-Resistance vs. Junction Temperature**



**Figure 5: On-Resistance vs. Gate-Source Voltage**



**Figure 6: Body-Diode Characteristics**

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

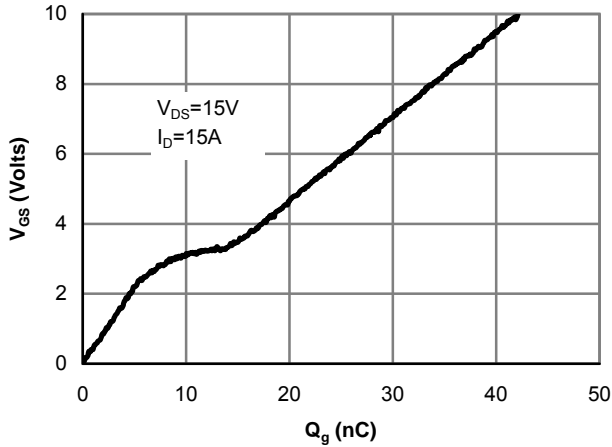


Figure 7: Gate-Charge Characteristics

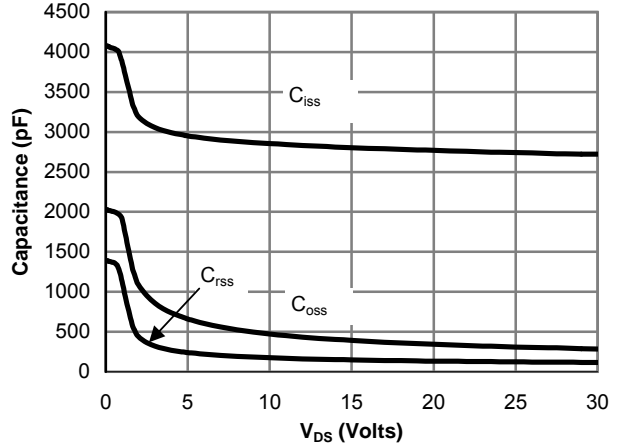


Figure 8: Capacitance Characteristics

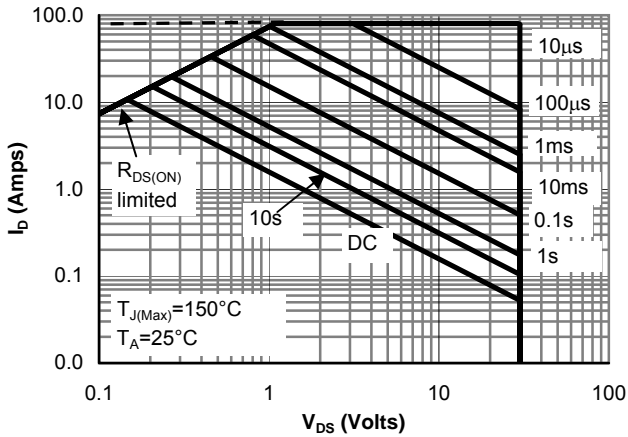


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

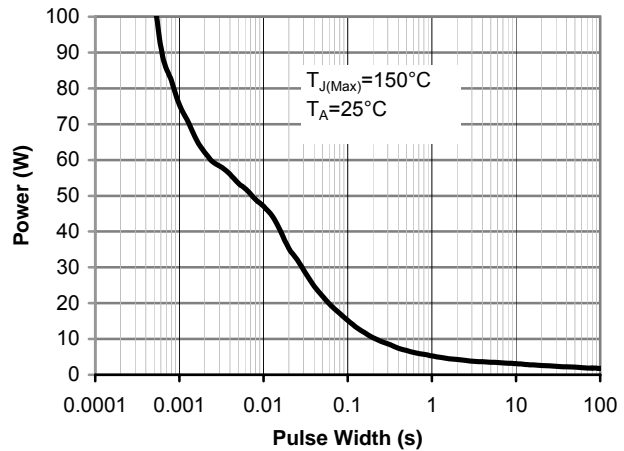


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

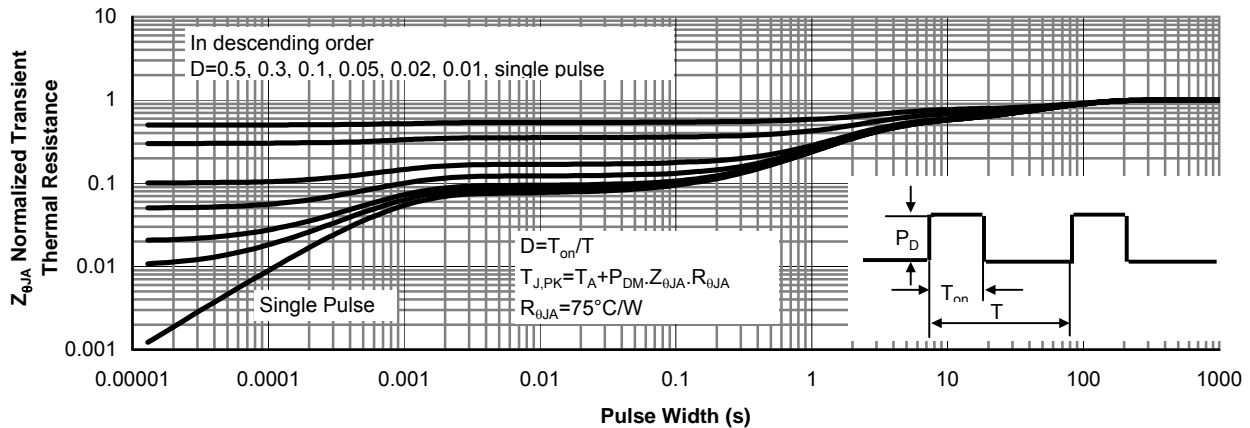


Figure 11: Normalized Maximum Transient Thermal Impedance (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

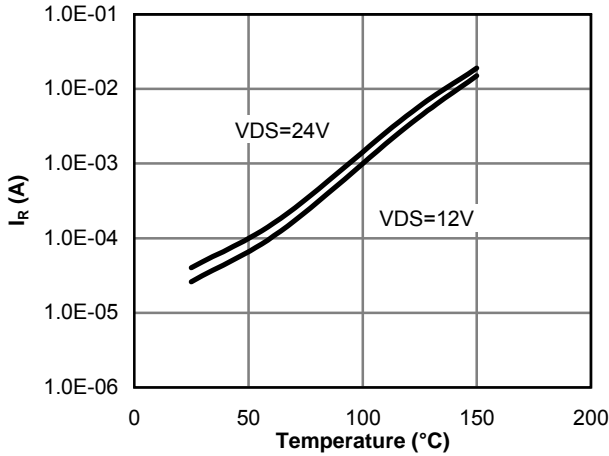


Figure 12: Diode Reverse Leakage Current vs. Junction Temperature

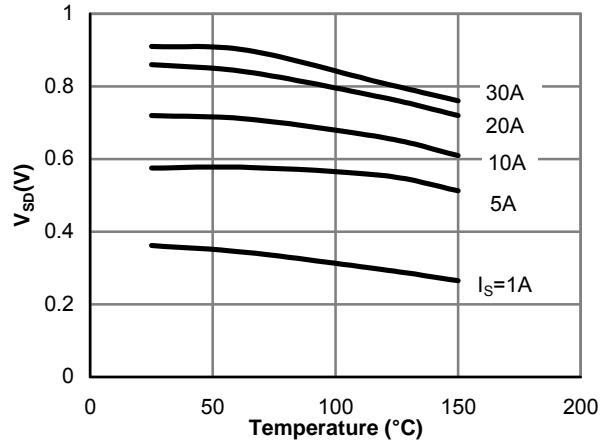


Figure 13: Diode Forward voltage vs. Junction Temperature

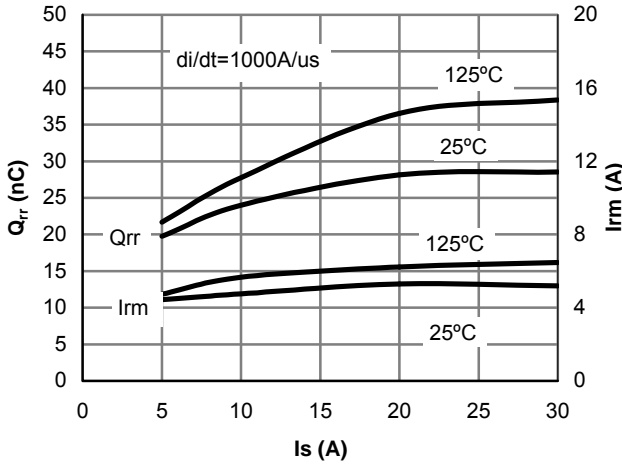


Figure 14: Diode Reverse Recovery Charge and Peak Current vs. Conduction Current

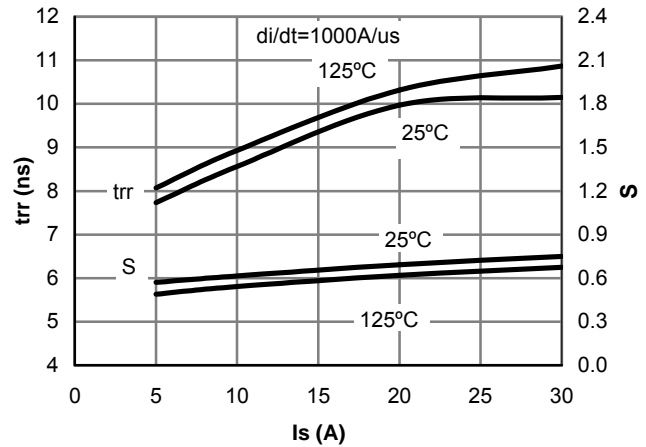


Figure 15: Diode Reverse Recovery Time and Soft Coefficient vs. Conduction Current

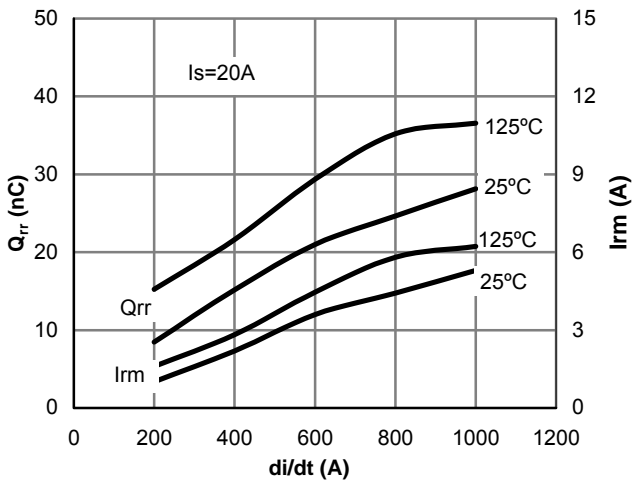


Figure 16: Diode Reverse Recovery Charge and Peak Current vs. di/dt

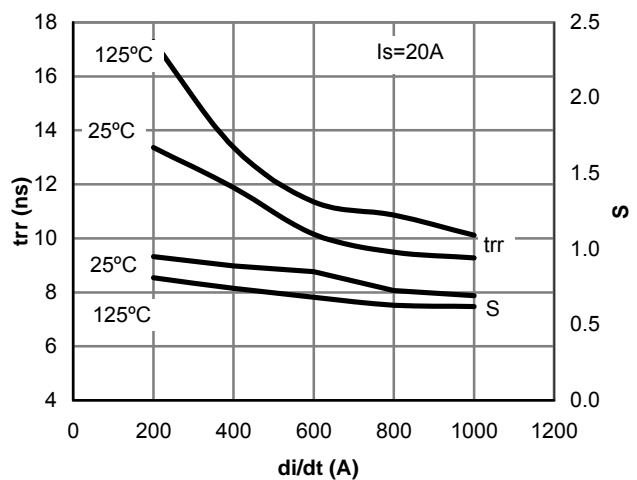


Figure 17: Diode Reverse Recovery Time and Soft Coefficient vs. di/dt