650V 25A Power MOSFET

■Description

XCH Semiconductor(XCH)has series Multi-EPI Super-Junction power MOSFET platforms for voltage up 500V to 1000 volts, bothwith design service and manufacturing capability, including cell,termination design and simulation.

The GSx25N65EF is a Low voltage N channel Multi-EPI Super-Junction power MOSFET sample with advanced technology to have better characteristics, such as fast switchingtime. low Ciss and Crss. low on resistance and excell entavalanche characteristics.

TO-247

TO-220F

■ Features

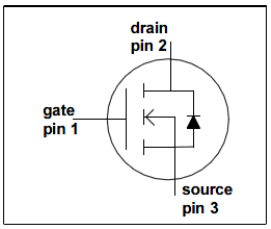
RDS(ON)=0.14Ω @VGS = 10V

VDS = 650V

Intrinsc fast-recovery body diode.

■ PKG

GSA25N65EF	GSW25N65EF
TO-220F	TO-247



■Absolute Maximum Ratings (TC = 25℃, unless otherwise specified)

Symbol	Parameter	GSW25N65EF	GSA25N65EF	Unit
V_{DSS}	Drain-Source Voltage	650		V
I_D	Drain Current -Continuous (TC = 25℃) -Continuous (TC = 100℃)	25* 15*		A
I_{DM}	Drain Current - Pulsed	53		A
V_{GSS}	Gate-Source voltage	±30		V
E_{AS}	Single Pulsed Avalanche Energy	500		mJ
I_{AR}	Avalanche Current	4		A
E_{AR}	Repetitive Avalanche Energy	1.2		mJ
dv/dt	Peak Diode Recovery dv/dt	15		V/ns
dVds/dt	Drain Source voltage slope (Vds=480V)	50		V/ns
P_D	Power Dissipation (TC = 25℃)	210	35	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		℃
T_L	Max. Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	300		℃

■Thermal Characteristics

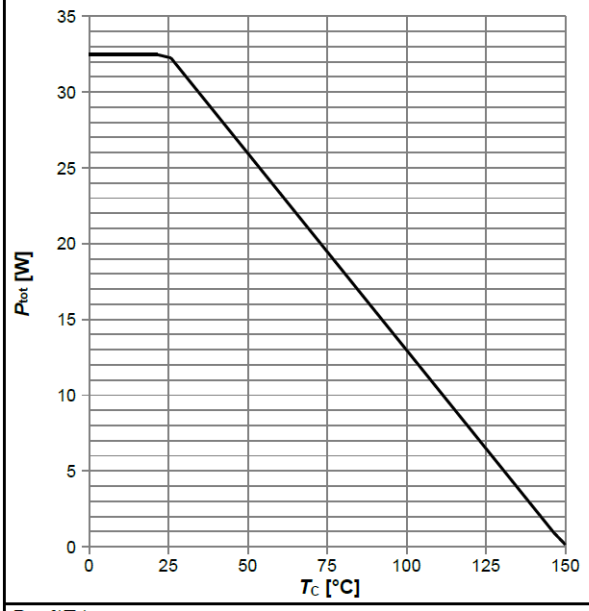
Symbol	Parameter	GSW25N65EF	GSA25N65EF	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.58	3.7	℃/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	---	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	62	℃/W

■ Electrical Characteristics (TJ=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA, T_J = 25℃	650	--	--	V
		V_{GS} = 0V, I_D = 250μA, T_J = 150℃	--	700	--	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250μA, Referenced to 25℃	--	0.6	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650V, V_{GS} = 0V -Tj=25 ℃ -T_J = 150℃	--	-- 10	1 -	μA μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30V, V_{DS} = 0V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30V, V_{DS} = 0V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2	--	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 12A	--	0.12	0.14	Ω
g_{FS}	Forward Transconductance	V_{DS} = 40V, I_D = 12A	--	16	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	--	1650	-	pF
C_{oss}	Output Capacitance		--	90	-	pF
C_{rss}	Reverse Transfer Capacitance		--	9	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 520V (Note 4)	--	28	--	ns
t_r	Turn-On Rise Time		--	19	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	140	--	ns
t_f	Turn-Off Fall Time		--	12	--	ns
Q_g	Total Gate Charge	V_{DS} = 520V, I_D = 12A V_{GS} = 10V (Note 4)	--	110	140	nC
Q_{gs}	Gate-Source Charge		--	9	--	nC
Q_{gd}	Gate-Drain Charge		--	15	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	25	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	75	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 12A	--	0.9	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0V, I_S = 12A dI_F/dt =100A/μs	--	190	--	ns
Q_{rr}	Reverse Recovery Charge		--	6	--	μC

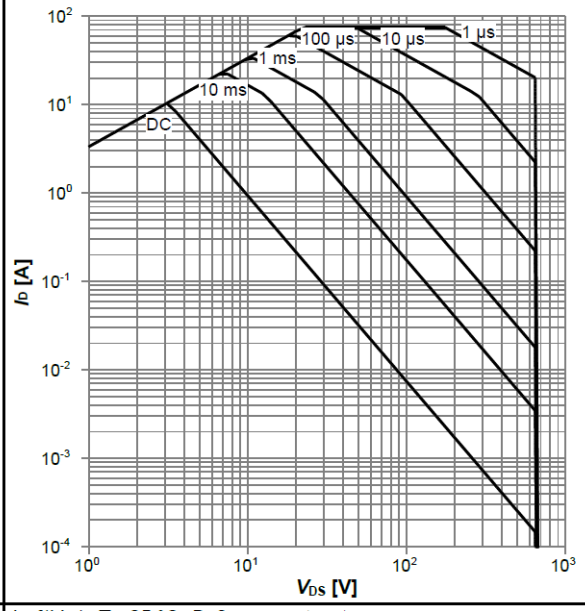
Typical Performance Characteristics

Diagram 1: Power dissipation



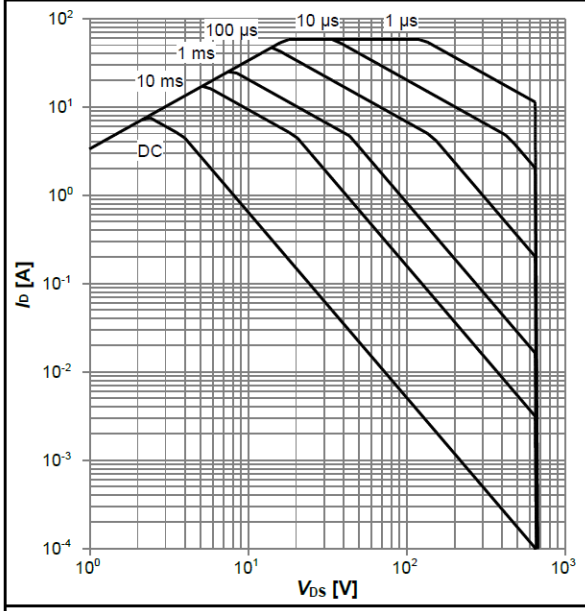
$P_{tot}=f(T_C)$

Diagram 2: Safe operating area



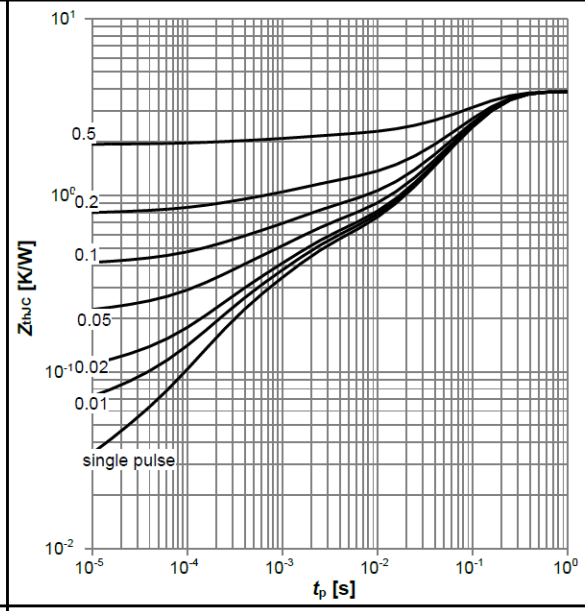
$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$; parameter: t_p

Diagram 3: Safe operating area



$I_D=f(V_{DS})$; $T_C=80$ °C; $D=0$; parameter: t_p

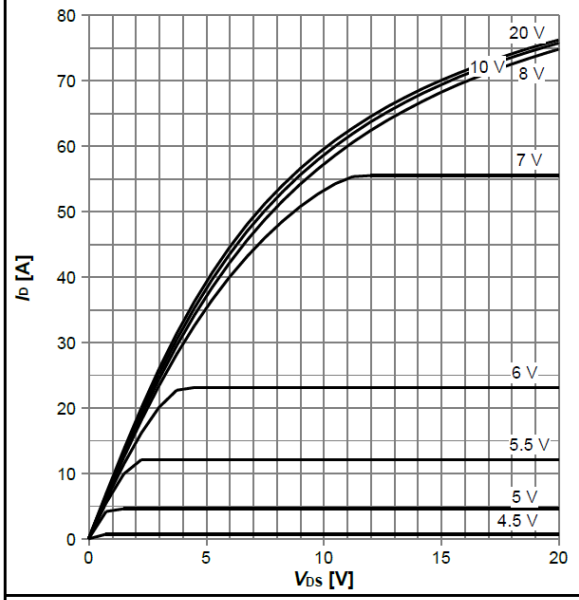
Diagram 4: Max. transient thermal impedance



$Z_{thJC}=f(t_P)$; parameter: $D=t_p/T$

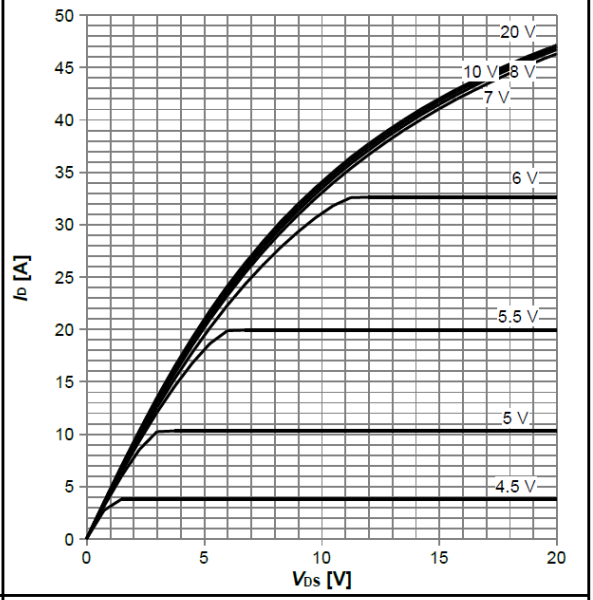
Typical Performance Characteristics

Diagram 5: Typ. output characteristics



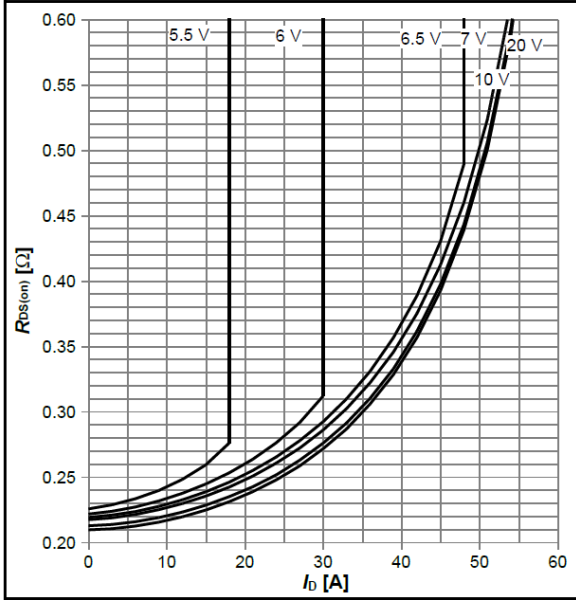
$I_D=f(V_{DS})$; $T_j=25$ °C; parameter: V_{GS}

Diagram 6: Typ. output characteristics



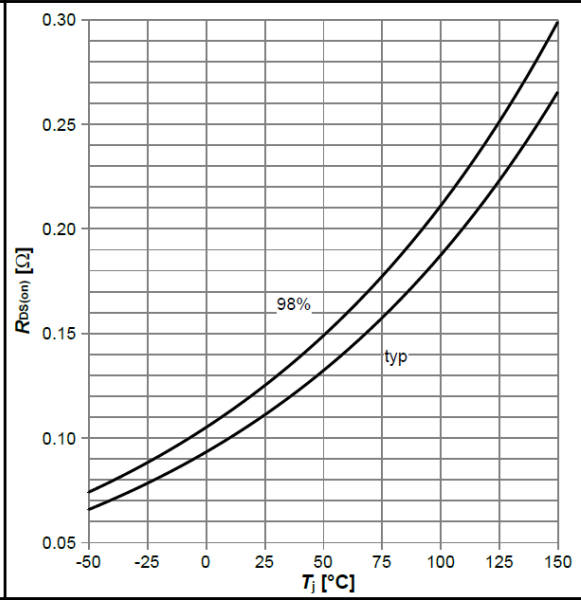
$I_D=f(V_{DS})$; $T_j=125$ °C; parameter: V_{GS}

Diagram 7: Typ. drain-source on-state resistance



$R_{DS(on)}=f(I_D)$; $T_j=125$ °C; parameter: V_{GS}

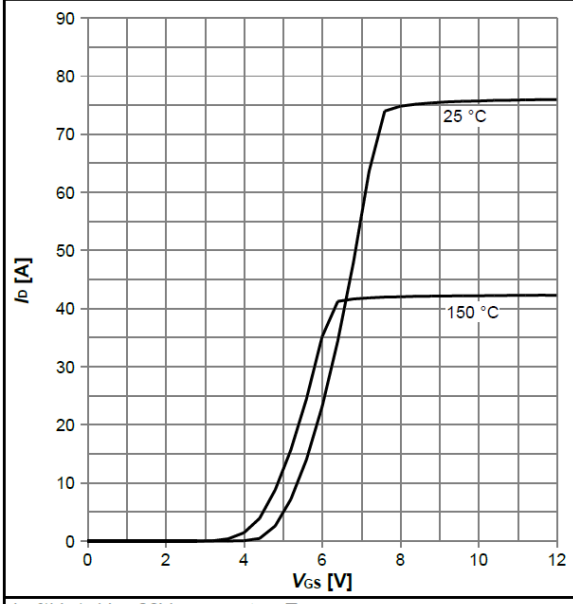
Diagram 8: Drain-source on-state resistance



$R_{DS(on)}=f(T_j)$; $I_D=8.9$ A; $V_{GS}=10$ V

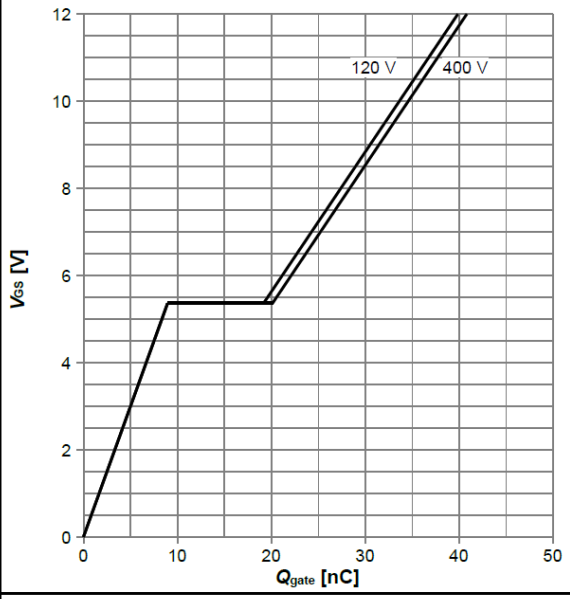
Typical Performance Characteristics

Diagram 9: Typ. transfer characteristics



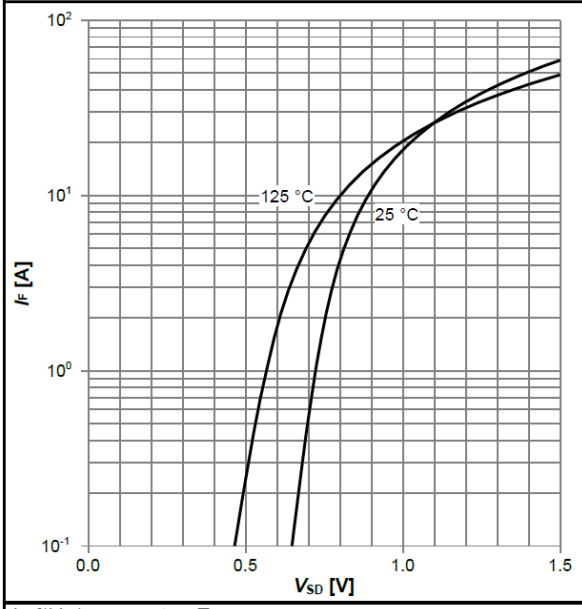
I_D=f(V_{GS}); V_{DS}=20V; parameter: T_j

Diagram 10: Typ. gate charge



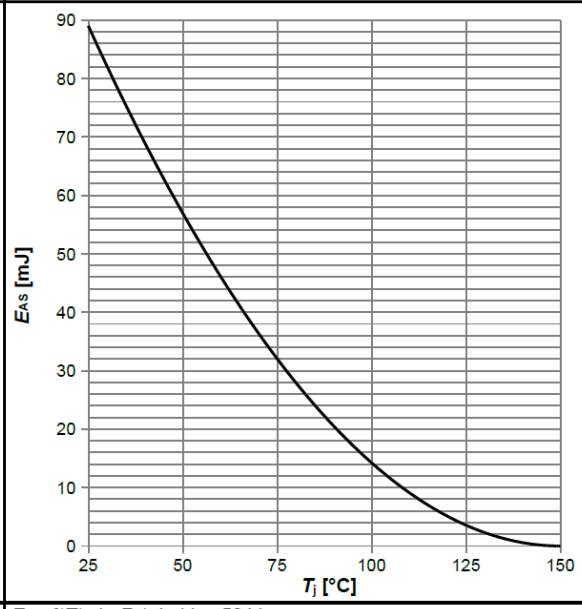
V_{GS}=f(Q_{gate}); I_D=8.9A pulsed; parameter: V_{DD}

Diagram 11: Forward characteristics of reverse diode



I_F=f(V_{SD}); parameter: T_j

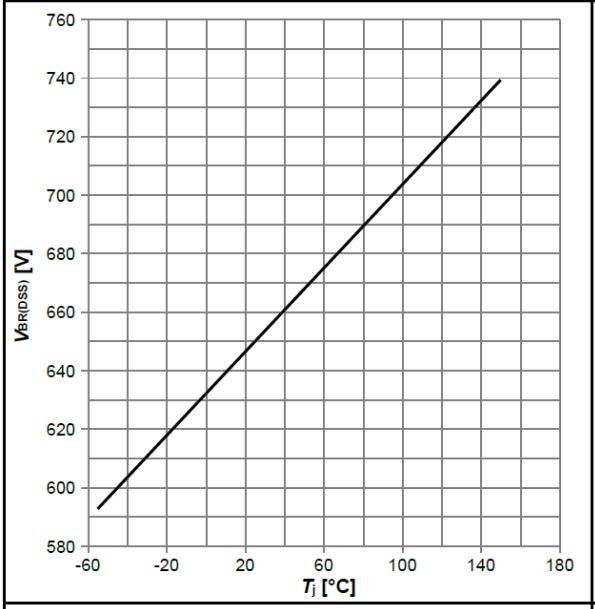
Diagram 12: Avalanche energy



E_{AS}=f(T_j); I_D=7.1 A; V_{DD}=50 V

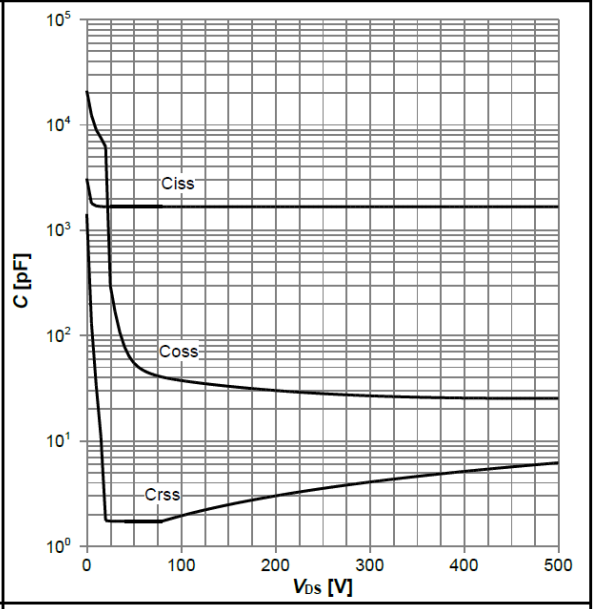
Typical Performance Characteristics

Diagram 13: Drain-source breakdown voltage



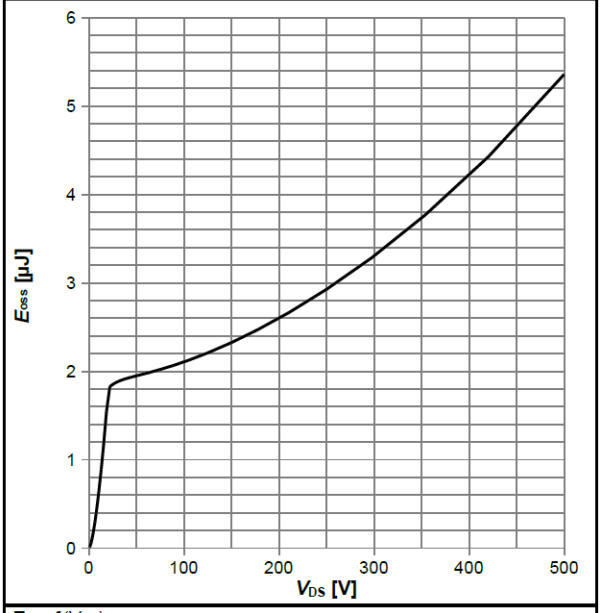
$V_{BR(DSS)}$=f(T_j); I_D=1 mA

Diagram 14: Typ. capacitances



C=f(V_{DS}); V_{GS}=0 V; f=250 kHz

Diagram 15: Typ. Coss stored energy



E_{oss}=f(V_{DS})