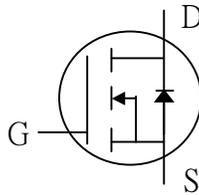# SILICON STANDARD CORP.

SSM20N03S,P

N-CHANNEL ENHANCEMENT-MODE
POWER MOSFET

Dynamic dv/dt rating

Repetitive-avalanche rated

Fast switching

Simple drive requirement

BV_{DSS}	30V
$R_{DS(ON)}$	52mΩ
I_D	20A

G — D — S

TO-263

TO-220

Description

Power MOSFETs from Silicon Standard provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

The TO-263 package is widely preferred for commercial and industrial surface mount applications and suited for low voltage applications such as DC/DC converters. The through-hole version (SSM20N03P) is available for low-footprint applications.
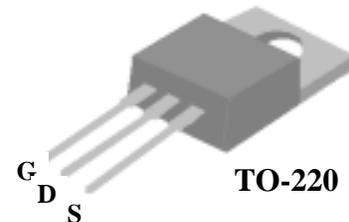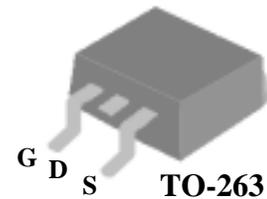
Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	30	V
V_{GS}	Gate-Source Voltage	$\pm$ 20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V	20	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V	13	A
I_{DM}	Pulsed Drain Current[1]	58	A
P_D@T_C=25℃	Total Power Dissipation	31	W
	Linear Derating Factor	0.25	W/℃
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter		Value	Unit
Rthj-case	Thermal Resistance Junction-case	Max.	4.0	℃/W
Rthj-amb	Thermal Resistance Junction-ambient	Max.	62	℃/W

Electrical Characteristics @ T$_j$=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV$_{DSS}$	Drain-Source Breakdown Voltage	V$_{GS}$=0V, I$_D$=250uA	30	-	-	V
ΔBV$_{DSS}$/ΔT$_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I$_D$=1mA	-	0.037	-	V/$^\circ$C
R$_{DS(ON)}$	Static Drain-Source On-Resistance	V$_{GS}$=10V, I$_D$=10A	-	-	52	mΩ
		V$_{GS}$=4.5V, I$_D$=8A	-	-	85	mΩ
V$_{GS(th)}$	Gate Threshold Voltage	V$_{DS}$=V$_{GS}$, I$_D$=250uA	1	-	3	V
g$_{fs}$	Forward Transconductance	V$_{DS}$=10V, I$_D$=10A	-	3	-	S
I$_{DSS}$	Drain-Source Leakage Current (T$_j$=25°C)	V$_{DS}$=30V, V$_{GS}$=0V	-	-	1	uA
	Drain-Source Leakage Current (T$_j$=150°C)	V$_{DS}$=24V, V$_{GS}$=0V	-	-	100	uA
I$_{GSS}$	Gate-Source Leakage	V$_{GS}$=$\pm$20V	-	-	$\pm$100	nA
Q$_g$	Total Gate Charge[2]	I$_D$=10A	-	6.1	-	nC
Q$_{gs}$	Gate-Source Charge	V$_{DS}$=24V	-	1.4	-	nC
Q$_{gd}$	Gate-Drain ("Miller") Charge	V$_{GS}$=5V	-	4	-	nC
t$_{d(on)}$	Turn-on Delay Time[2]	V$_{DS}$=15V	-	4.9	-	ns
t$_r$	Rise Time	I$_D$=20A	-	29	-	ns
t$_{d(off)}$	Turn-off Delay Time	R$_G$=3.3Ω,V$_{GS}$=10V	-	14.3	-	ns
t$_f$	Fall Time	R$_D$=0.75Ω	-	3.6	-	ns
C$_{iss}$	Input Capacitance	V$_{GS}$=0V	-	290	-	pF
C$_{oss}$	Output Capacitance	V$_{DS}$=25V	-	160	-	pF
C$_{rss}$	Reverse Transfer Capacitance	f=1.0MHz	-	45	-	pF

Source-Drain Diode

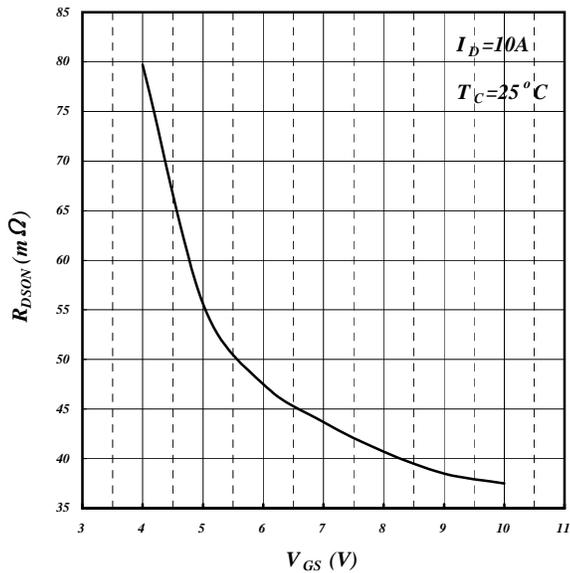| Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I$_S$	Continuous Source Current (Body Diode)	V$_D$=V$_G$=0V , V$_S$=1.3V	-	-	20	A
I$_{SM}$	Pulsed Source Current (Body Diode)[1]		-	-	58	A
V$_{SD}$	Forward On Voltage[2]	T$_j$=25°C, I$_S$=20A, V$_{GS}$=0V	-	-	1.3	V

Notes:

1.Pulse width limited by safe operating area.

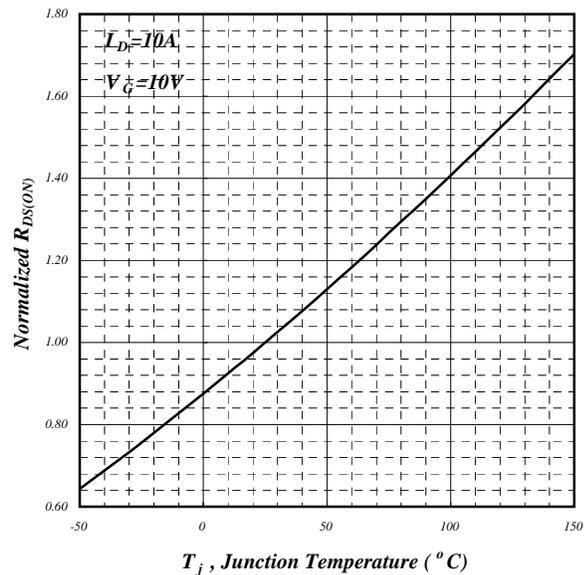2.Pulse width $\leq$300us , duty cycle $\leq$2%.
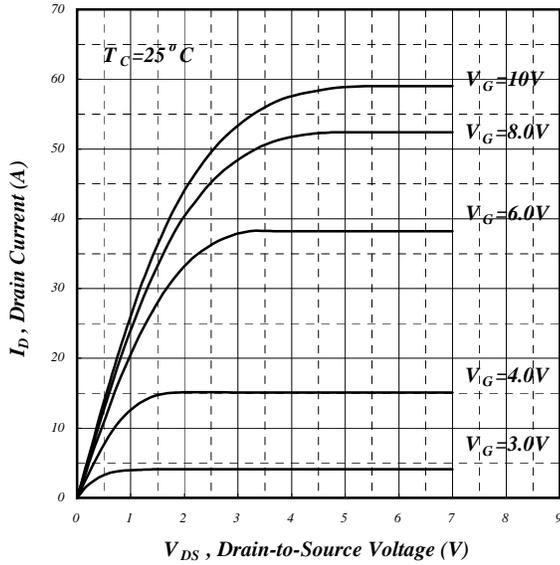
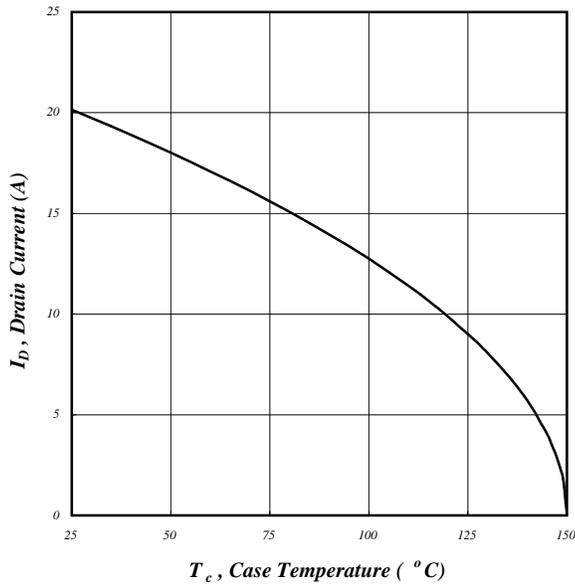**Fig 1. Typical Output Characteristics**
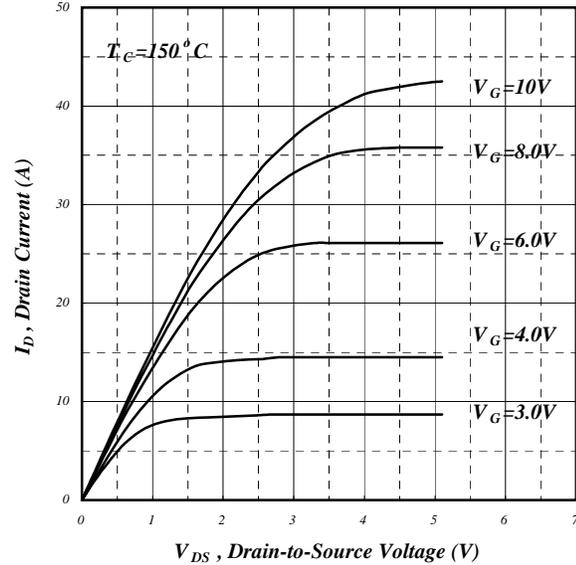
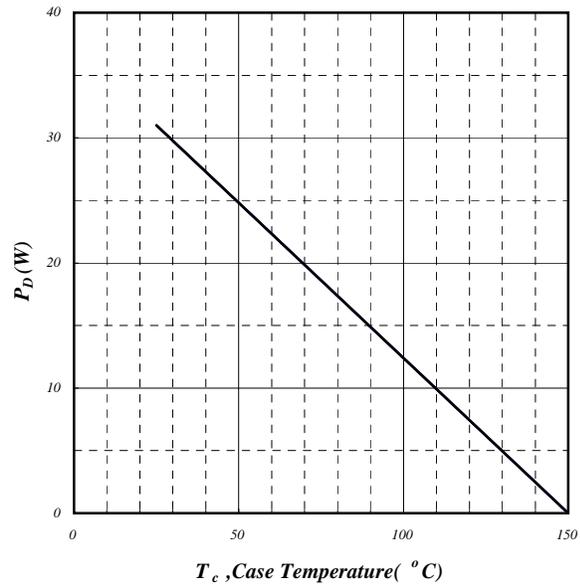**Fig 2. Typical Output Characteristics**
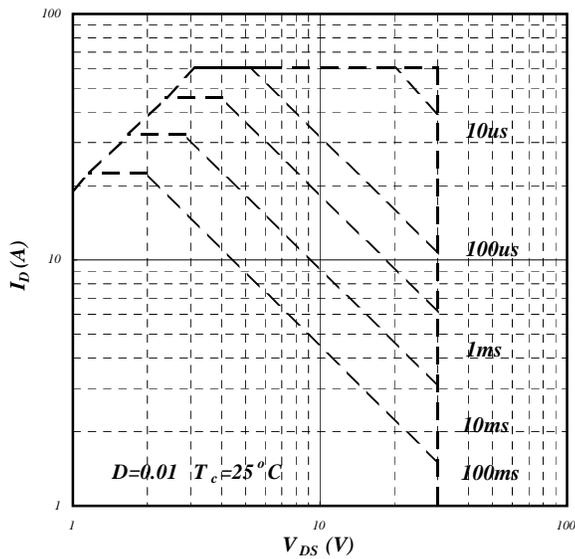

Fig 3. On-Resistance v.s. Gate Voltage

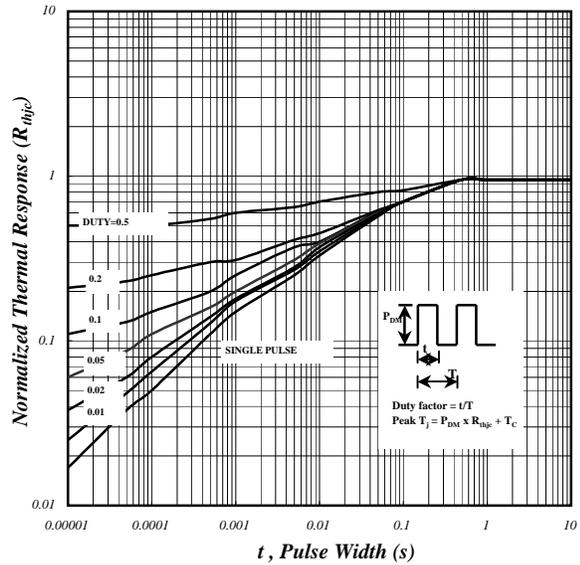**Fig 4. Normalized On-Resistance**
v.s. Junction Temperature

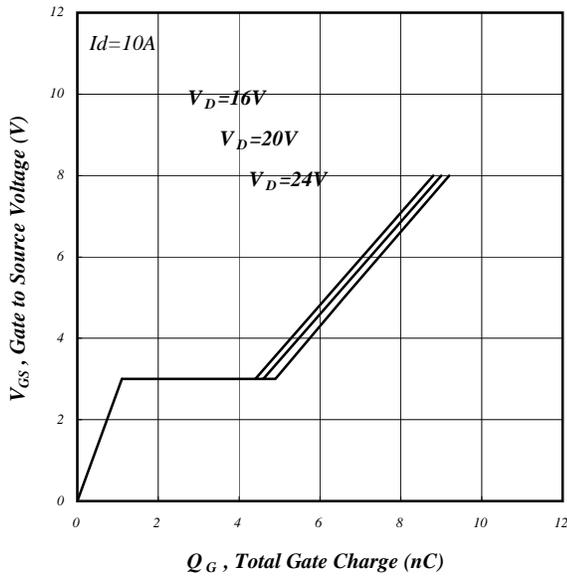Fig 5. Maximum Drain Current v.s.
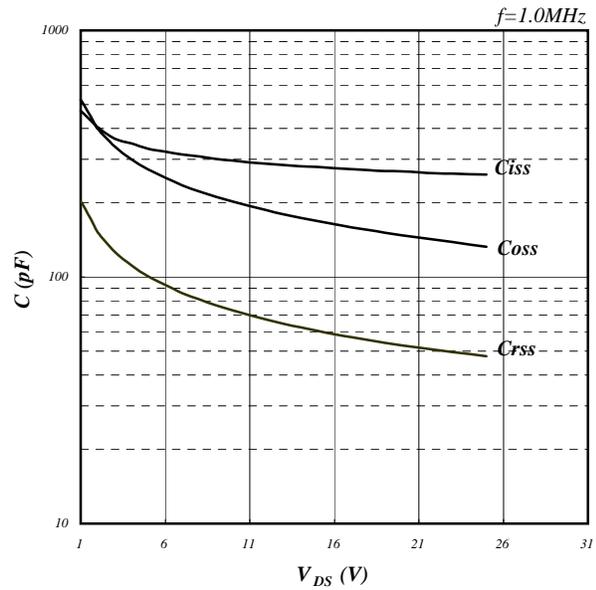Case Temperature

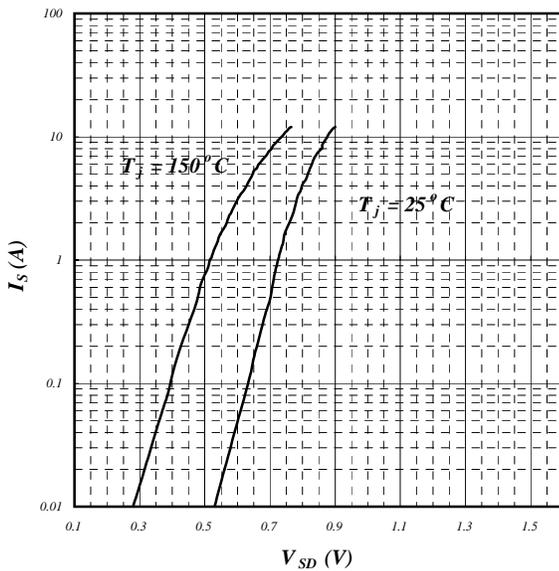Fig 6. Typical Power Dissipation

Fig 7. Maximum Safe Operating Area
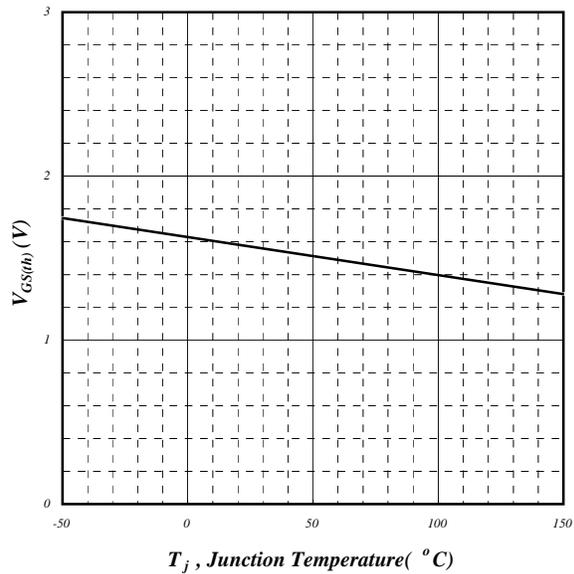

Fig 8. Effective Transient Thermal Impedance
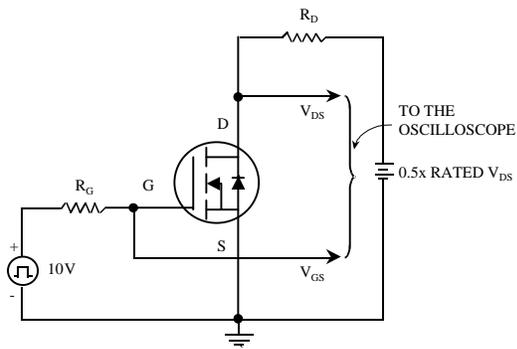
Fig 9. Gate Charge Characteristics
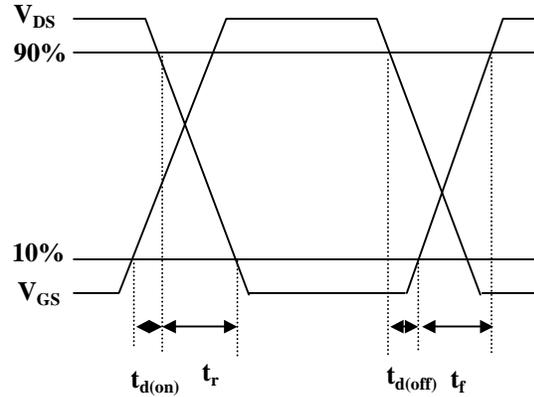

Fig 10. Typical Capacitance Characteristics

Fig 11. Forward Characteristic of
Reverse Diode

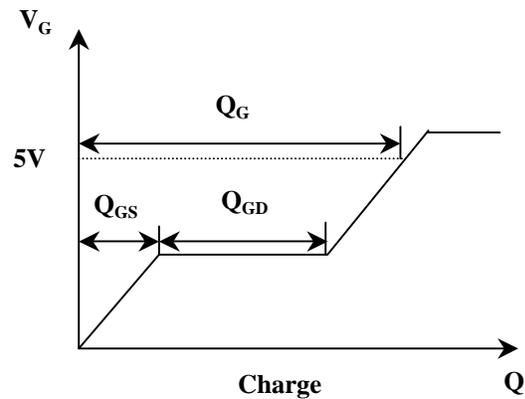**Fig 12. Gate Threshold Voltage v.s.**
Junction Temperature

Fig 13. Switching Time Circuit

Fig 14. Switching Time Waveform
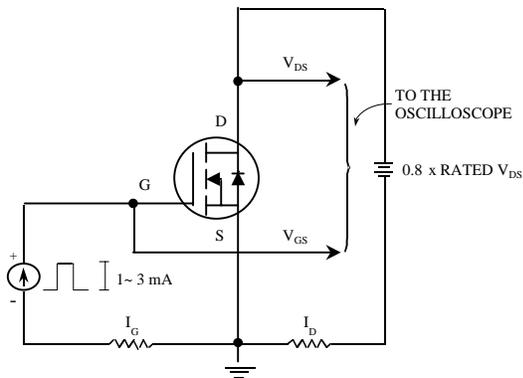
Fig 15. Gate Charge Circuit

Fig 16. Gate Charge Waveform