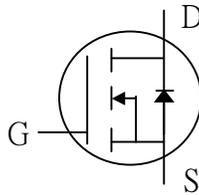


## N-CHANNEL ENHANCEMENT-MODE POWER MOSFET

- Dynamic dv/dt rating
- Repetitive-avalanche rated
- Fast switching
- Simple drive requirement

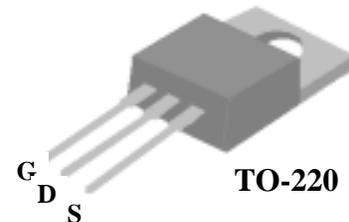
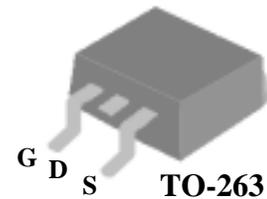


$BV_{DSS}$	30V
$R_{DS(ON)}$	52m $\Omega$
$I_D$	20A

### 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
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	20	A
$I_D @ T_C = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	13	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	58	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation	31	W
	Linear Derating Factor	0.25	W/ $^\circ C$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ C$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ C$

### Thermal Data

Symbol	Parameter	Value	Unit
Rthj-case	Thermal Resistance Junction-case	Max. 4.0	$^\circ C/W$
Rthj-amb	Thermal Resistance Junction-ambient	Max. 62	$^\circ C/W$

**Electrical Characteristics @  $T_j=25^\circ\text{C}$  (unless otherwise specified)**

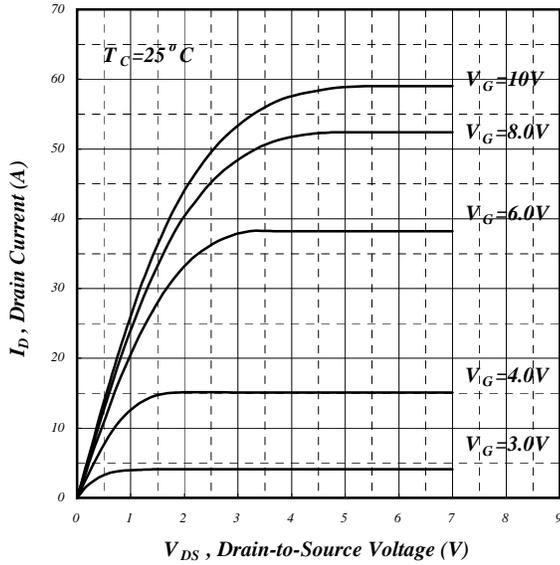
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=1\text{mA}$	-	0.037	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=10A$	-	-	52	$m\Omega$
		$V_{GS}=4.5V, I_D=8A$	-	-	85	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=10A$	-	3	-	S
$I_{DSS}$	Drain-Source Leakage Current ( $T_j=25^\circ\text{C}$ )	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$
	Drain-Source Leakage Current ( $T_j=150^\circ\text{C}$ )	$V_{DS}=24V, V_{GS}=0V$	-	-	100	$\mu A$
$I_{GSS}$	Gate-Source Leakage	$V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=10A$	-	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 <sup>2</sup>	$V_{DS}=15V$	-	4.9	-	ns
$t_r$	Rise Time	$I_D=20A$	-	29	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	14.3	-	ns
$t_f$	Fall Time	$R_D=0.75\Omega$	-	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	$f=1.0\text{MHz}$	-	45	-	pF

**Source-Drain Diode**

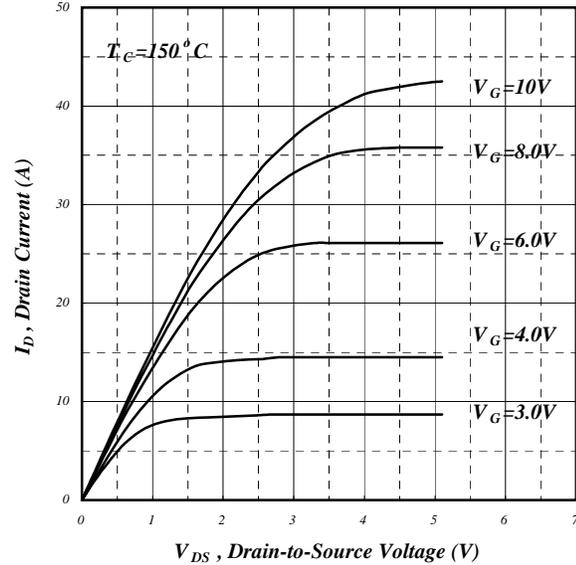
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0V, V_S=1.3V$	-	-	20	A
$I_{SM}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	58	A
$V_{SD}$	Forward On Voltage <sup>2</sup>	$T_j=25^\circ\text{C}, I_S=20A, V_{GS}=0V$	-	-	1.3	V

**Notes:**

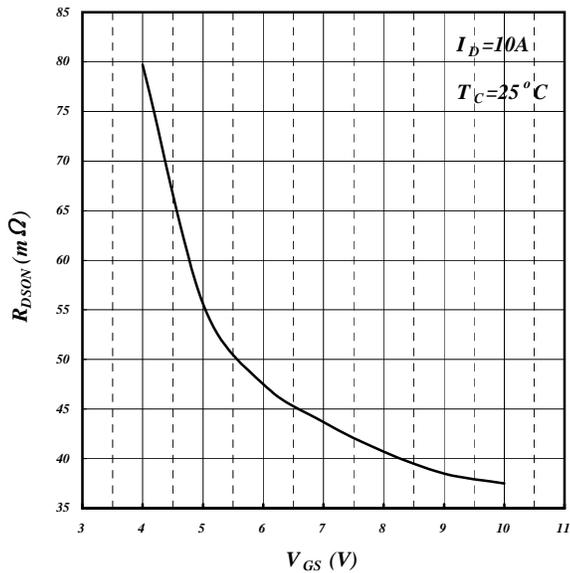
- 1.Pulse width limited by safe operating area.
- 2.Pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$ .



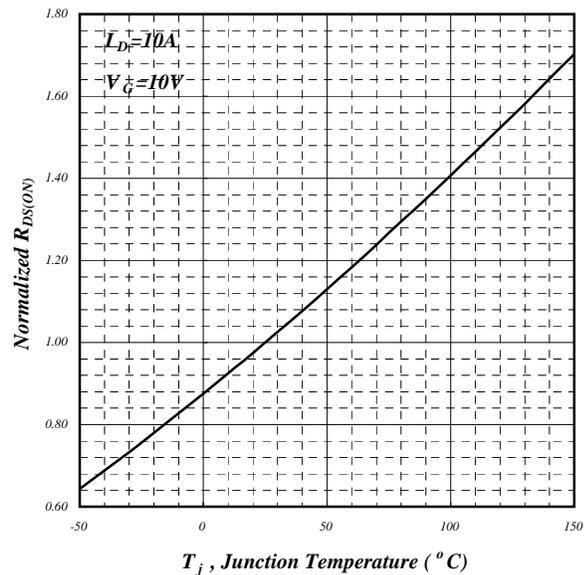
**Fig 1. Typical Output Characteristics**



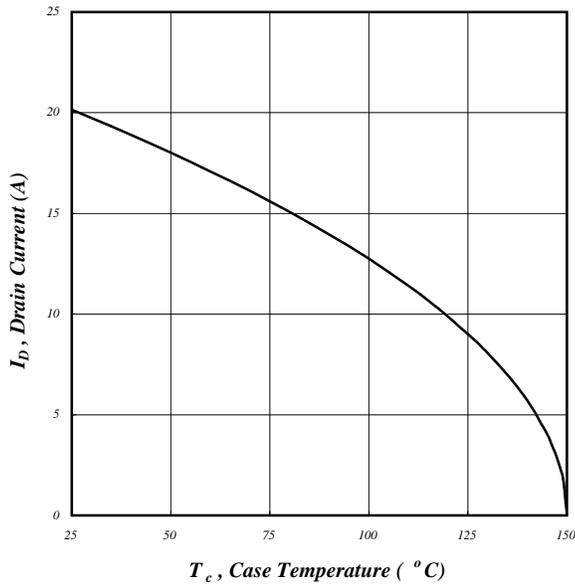
**Fig 2. Typical Output Characteristics**



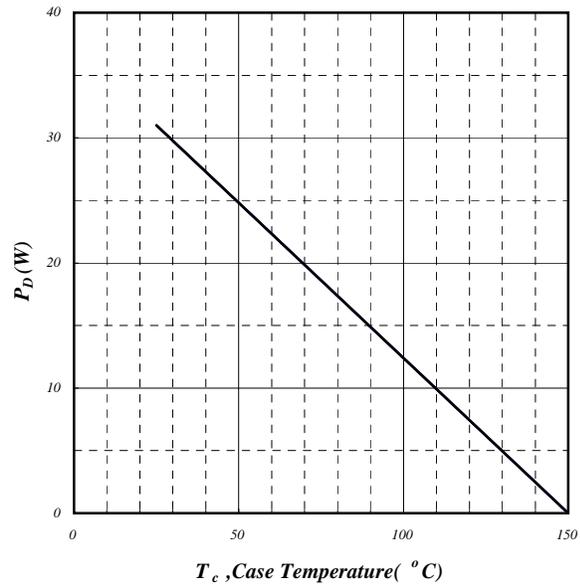
**Fig 3. On-Resistance v.s. Gate Voltage**



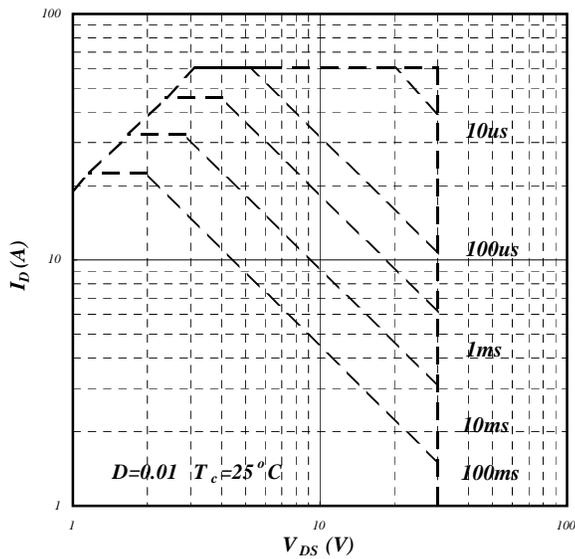
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



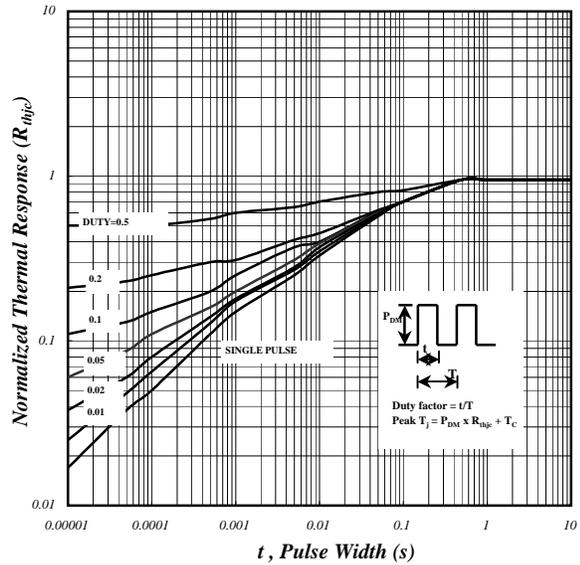
**Fig 5. Maximum Drain Current v.s. Case Temperature**



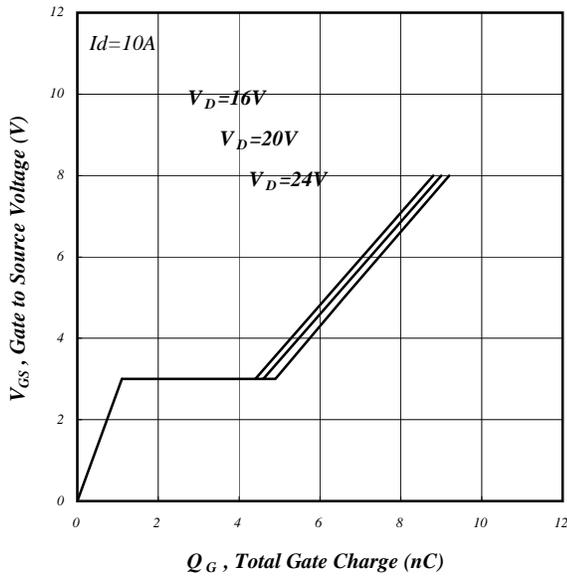
**Fig 6. Typical Power Dissipation**



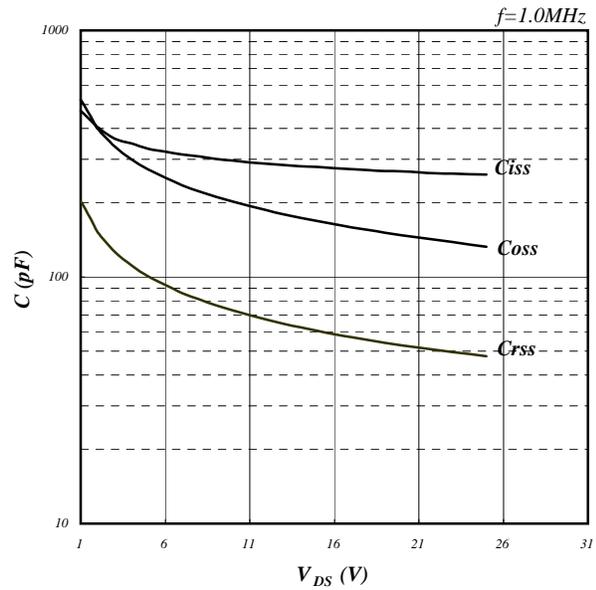
**Fig 7. Maximum Safe Operating Area**



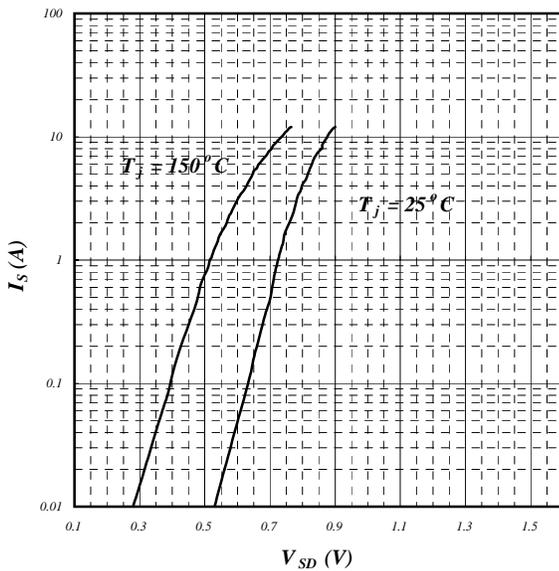
**Fig 8. Effective Transient Thermal Impedance**



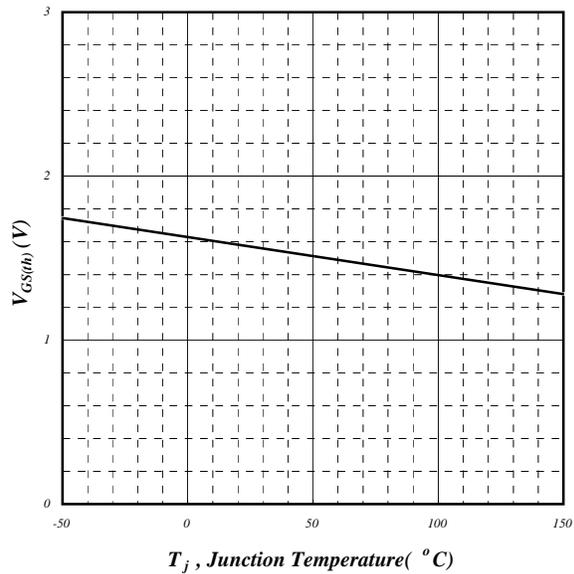
**Fig 9. Gate Charge Characteristics**



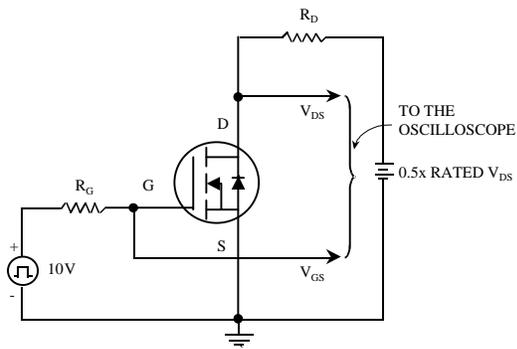
**Fig 10. Typical Capacitance Characteristics**



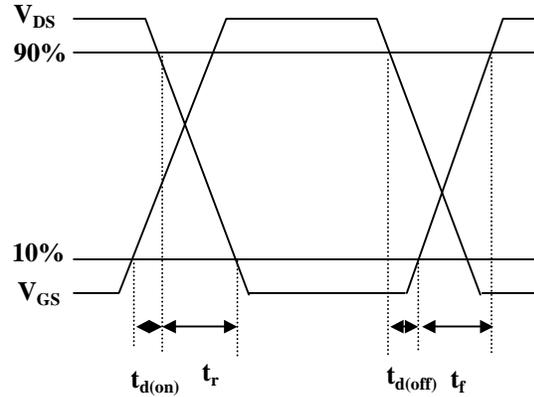
**Fig 11. Forward Characteristic of Reverse Diode**



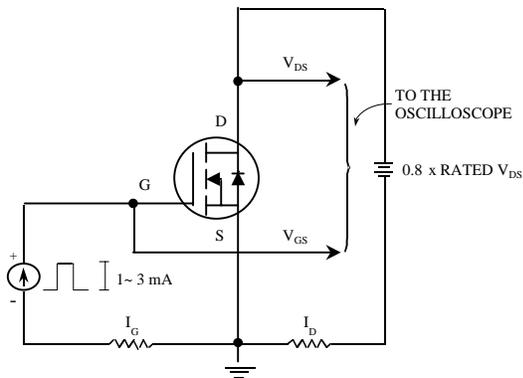
**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**



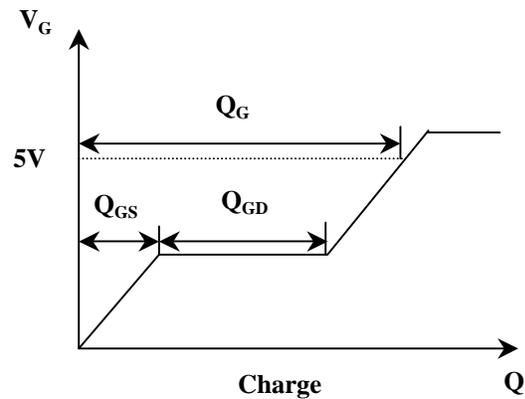
**Fig 13. Switching Time Circuit**



**Fig 14. Switching Time Waveform**



**Fig 15. Gate Charge Circuit**



**Fig 16. Gate Charge Waveform**

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