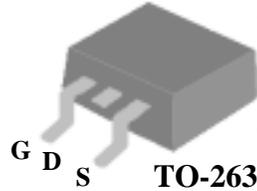


## N-CHANNEL ENHANCEMENT-MODE POWER MOSFET

Low Gate Charge  
Simple Drive Requirement  
Fast Switching

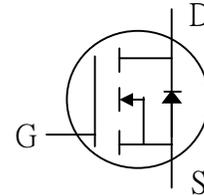


$BV_{DSS}$  30V  
 $R_{DS(ON)}$  17m $\Omega$   
 $I_D$  40A

### Description

Power MOSFETs from Silicon Standard Corp. 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 all commercial and industrial surface mount applications and suited for low voltage applications such as DC/DC converters. The through-hole version (SSM40N03P) 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	40	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, $V_{GS}$ @ 10V	30	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	169	A
$P_D @ T_C=25^\circ C$	Total Power Dissipation	50	W
	Linear Derating Factor	0.4	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-c	Thermal Resistance Junction-case	Max. 2.5	$^\circ C/W$
Rthj-a	Thermal Resistance Junction-ambient	Max. 62	$^\circ C/W$

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

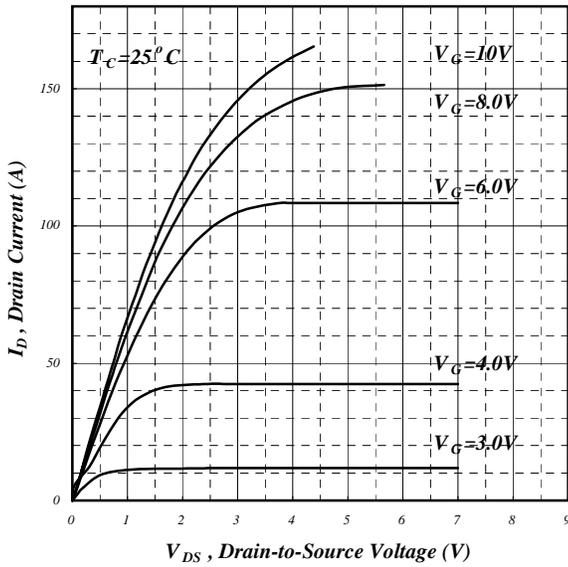
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to $25^\circ\text{C}, I_D=1\text{mA}$	-	0.037	-	$V/^\circ\text{C}$
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=20A$	-	14	17	$\text{m}\Omega$
		$V_{GS}=4.5V, I_D=16A$	-	20	23	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	3	V
$g_{fs}$	Forward Transconductance	$V_{DS}=10V, I_D=20A$	-	26	-	S
$I_{DSS}$	Drain-Source Leakage Current ( $T_j=25^\circ\text{C}$ )	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu\text{A}$
	Drain-Source Leakage Current ( $T_j=150^\circ\text{C}$ )	$V_{DS}=24V, V_{GS}=0V$	-	-	25	$\mu\text{A}$
$I_{GSS}$	Gate-Source Forward Leakage	$V_{GS}=\pm 20V$	-	-	$\pm 100$	nA
$Q_g$	Total Gate Charge <sup>2</sup>	$I_D=20A$	-	17	-	nC
$Q_{gs}$	Gate-Source Charge	$V_{DS}=24V$	-	3	-	nC
$Q_{gd}$	Gate-Drain ("Miller") Charge	$V_{GS}=5V$	-	10	-	nC
$t_{d(on)}$	Turn-on Delay Time <sup>2</sup>	$V_{DS}=15V$	-	7.2	-	ns
$t_r$	Rise Time	$I_D=20A$	-	60	-	ns
$t_{d(off)}$	Turn-off Delay Time	$R_G=3.3\Omega, V_{GS}=10V$	-	22.5	-	ns
$t_f$	Fall Time	$R_D=0.75\Omega$	-	10	-	ns
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	-	800	-	pF
$C_{oss}$	Output Capacitance	$V_{DS}=25V$	-	380	-	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1.0\text{MHz}$	-	133	-	pF

**Source-Drain Diode**

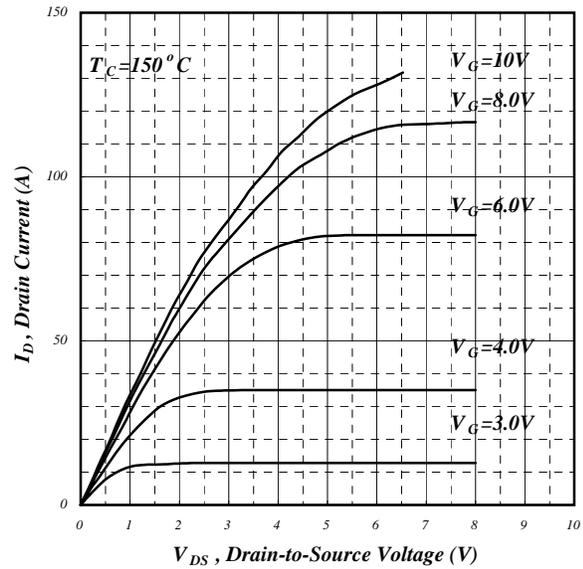
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
$I_S$	Continuous Source Current ( Body Diode )	$V_D=V_G=0V, V_S=1.3V$	-	-	40	A
$I_{SM}$	Pulsed Source Current ( Body Diode ) <sup>1</sup>		-	-	169	A
$V_{SD}$	Forward On Voltage <sup>2</sup>	$T_j=25^\circ\text{C}, I_S=40A, V_{GS}=0V$	-	-	1.3	V

**Notes:**

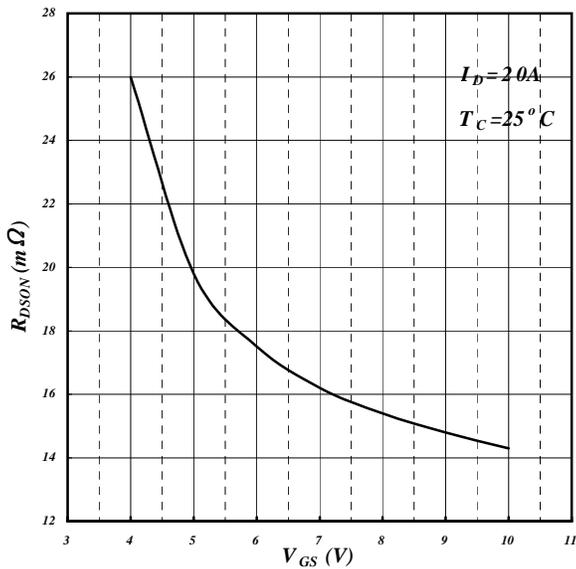
- 1.Pulse width limited by safe operating area.
- 2.Pulse width  $\leq 300\mu\text{s}$  , duty cycle  $\leq 2\%$ .



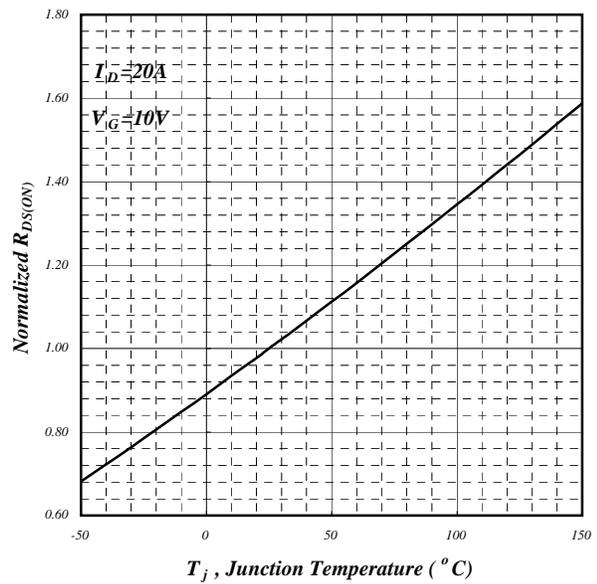
**Fig 1. Typical Output Characteristics**



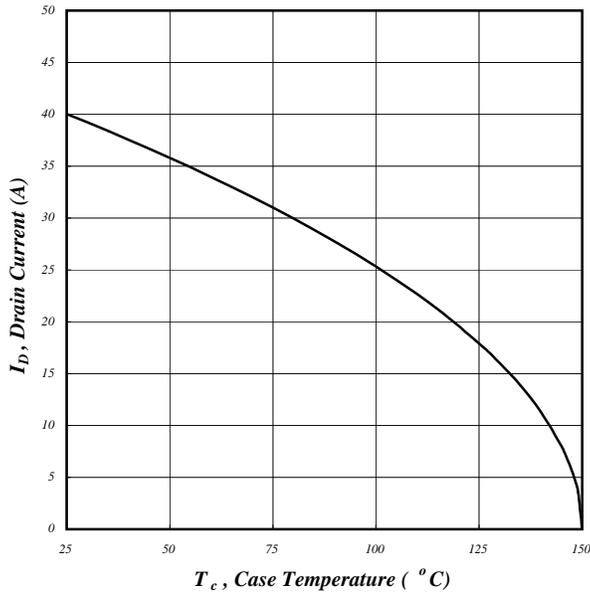
**Fig 2. Typical Output Characteristics**



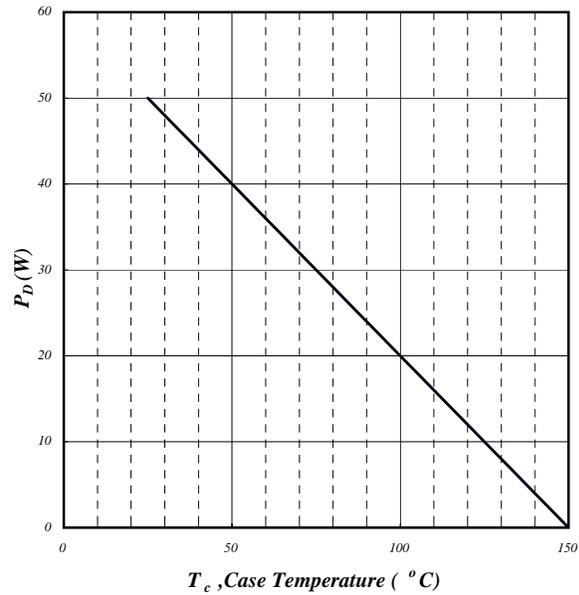
**Fig 3. On-Resistance v.s. Gate Voltage**



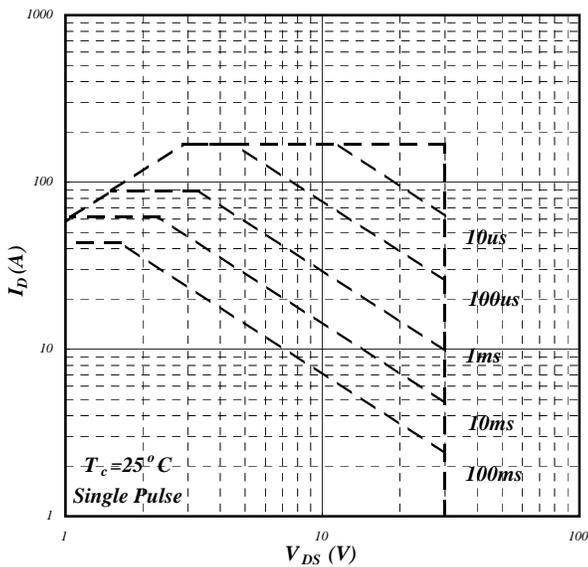
**Fig 4. Normalized On-Resistance v.s. Junction Temperature**



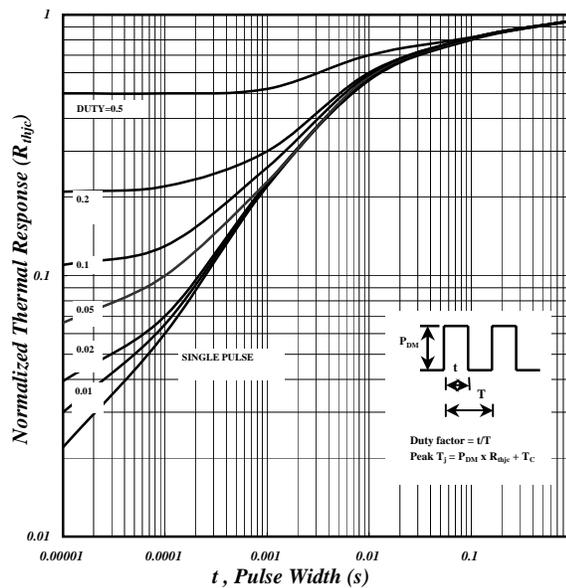
**Fig 5. Maximum Drain Current v.s. Case Temperature**



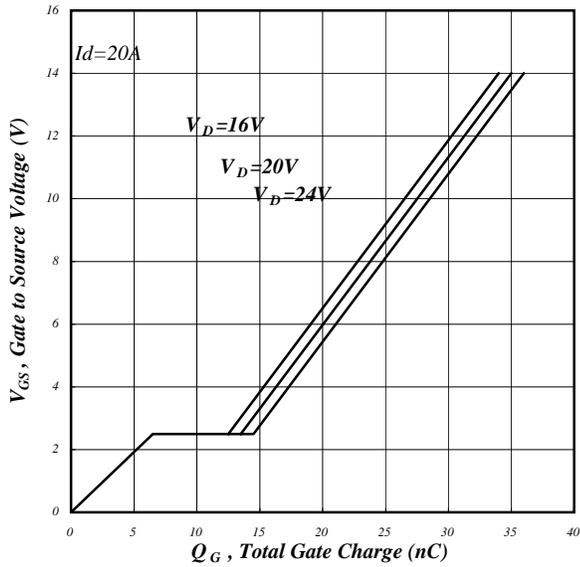
**Fig 6. Typical Power Dissipation**



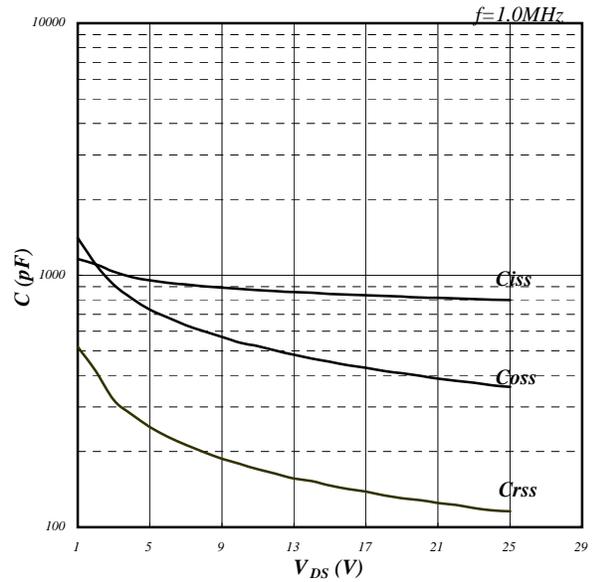
**Fig 7. Maximum Safe Operating Area**



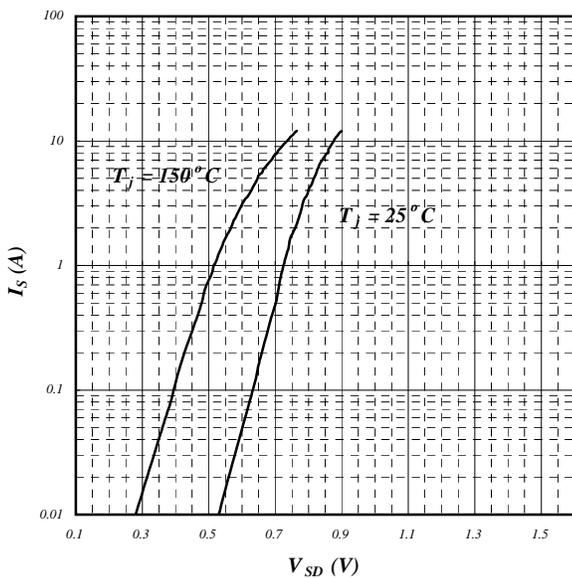
**Fig 8. Effective Transient Thermal Impedance**



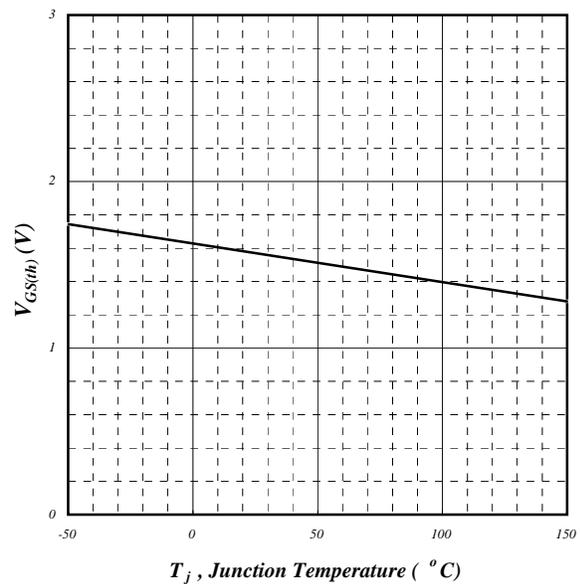
**Fig 9. Gate Charge Characteristics**



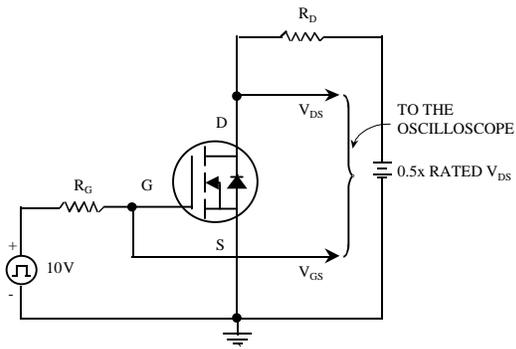
**Fig 10. Typical Capacitance Characteristics**



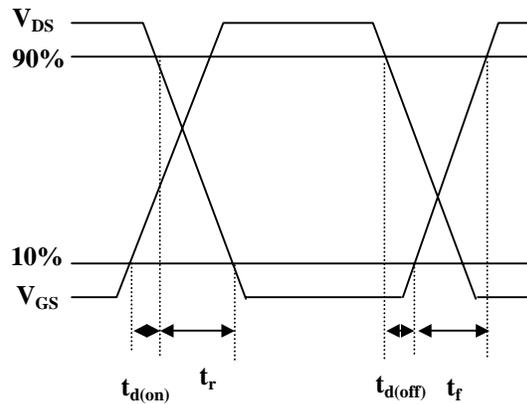
**Fig 11. Forward Characteristic of Reverse Diode**



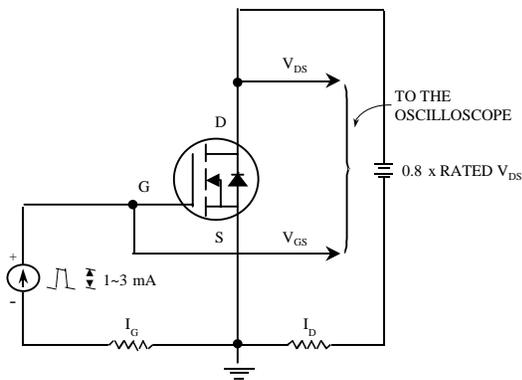
**Fig 12. Gate Threshold Voltage v.s. Junction Temperature**



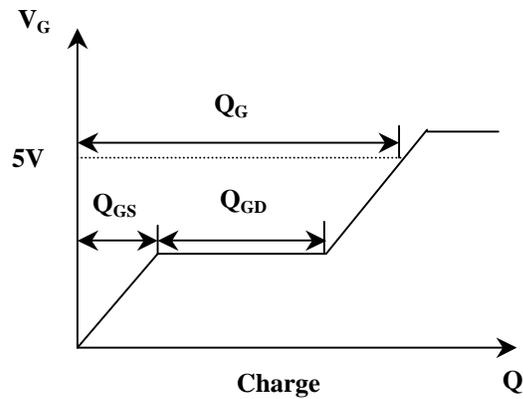
**Fig 13. Switching Time Circuit**



**Fig 14. Switching Time Waveform**



**Fig 15. Gate Charge Circuit**



**Fig 16. Gate Charge Waveform**

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