

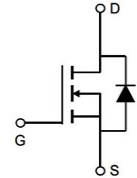
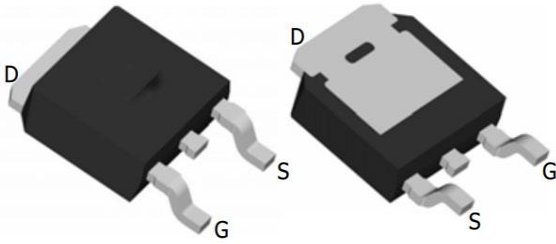
**40V /20A Single N Power MOSFET**
**General Description**

40V /20A Single N Power MOSFET

 Very low on-resistance  $R_{DS(on)}$  @  $V_{GS}=4.5$  V

Pb-free lead plating; RoHS compliant

<b><math>V_{DS}</math></b>	40	V
<b><math>R_{DS(on),TYP@V_{GS}=10V}</math></b>	28.0	m $\Omega$
<b><math>R_{DS(on),TYP@V_{GS}=4.5}</math></b>	44.0	m $\Omega$
<b><math>I_D</math></b>	20	A



Part ID	Package Type	Marking	Tape and reel information
SM454AT9RL	TO-252	20N04	2500


 100% UIS Tested  
 100% Kg Tested

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	$V_{DS}$	40	V
Gate-Source Voltage	$V_{GS}$	20	$\pm$ V
Continuous Drain Current <sup>A</sup>	$I_D$	$T_A=25^\circ\text{C}$	A
		$T_A=70^\circ\text{C}$	
Pulsed Drain Current <sup>B</sup>	$I_{DM}$	32.0	
Avalanche Current <sup>C</sup>	$I_{AR}$	6.4	
Repetitive avalanche energy $L=0.1\text{mH}$ <sup>C</sup>	$E_{AR}$	14.7	mJ
Power Dissipation <sup>A</sup>	$P_D$	$T_A=25^\circ\text{C}$	W
		$T_A=70^\circ\text{C}$	
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>	$R_{\theta JA}$	100	150	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient <sup>A</sup>		Steady State	200	240
Maximum Junction-to-Lead <sup>C</sup>	$R_{\theta JL}$	60	96	$^\circ\text{C}/\text{W}$



**STATIC PARAMETERS**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> = -250uA, V <sub>GS</sub> = 0V	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V			1 5	uA
I <sub>GSS</sub>	Gate-Body leakage current	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> = 250µA	1.5	2.3	3	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =20A V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		28.0 44.0	40.0 57.2	mΩ
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		94		S
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =1A, V <sub>GS</sub> =89V		0.72	1	V
I <sub>S</sub>	Maximum Body-Diode Continuous Current				20	A

**DYNAMIC PARAMETERS**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =15V, f=1MHz		516	629	pF
C <sub>oss</sub>	Output Capacitance			82	100	pF
C <sub>rss</sub>	Reverse Transfer Capacitance			43	51	pF
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz			0.8	Ω

**SWITCHING PARAMETERS**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Q <sub>g</sub> (10V)	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, I <sub>D</sub> =20A		8.3		nC
Q <sub>g</sub> 4.5V)	Total Gate Charge			4.15		
Q <sub>gs</sub>	Gate Source Charge			1.12		
Q <sub>gd</sub>	Gate Drain Charge			1.6		
t <sub>D(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> =10V, V <sub>DS</sub> =15V, R <sub>L</sub> =0.75Ω, R <sub>GEN</sub> =3Ω		9		ns
t <sub>r</sub>	Turn-On Rise Time			7.2		
t <sub>D(off)</sub>	Turn-Off DelayTime			25.2		
t <sub>f</sub>	Turn-Off Fall Time			8.1		
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =-8A, dI/dt=500A/µs		18		ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge	I <sub>F</sub> =18A, dI/dt=500A/µs		10		nC

## DC ELECTRICAL AND THERMAL CHARACTERISTICS

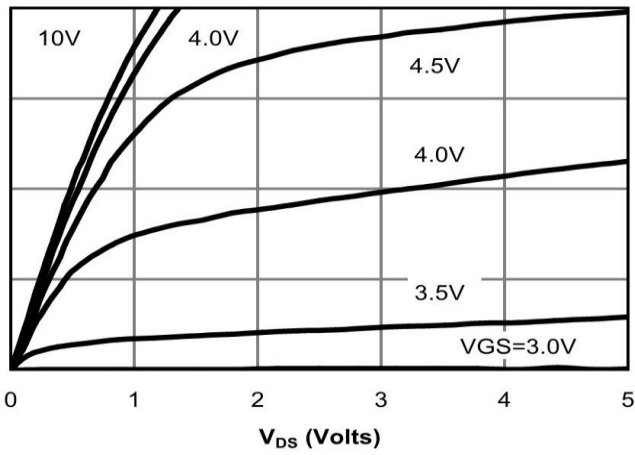


Figure 1: On-Region Characteristics

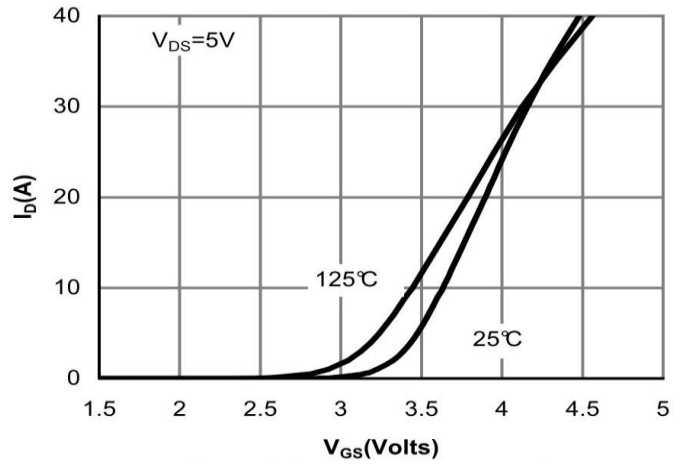


Figure 2: Transfer Characteristics

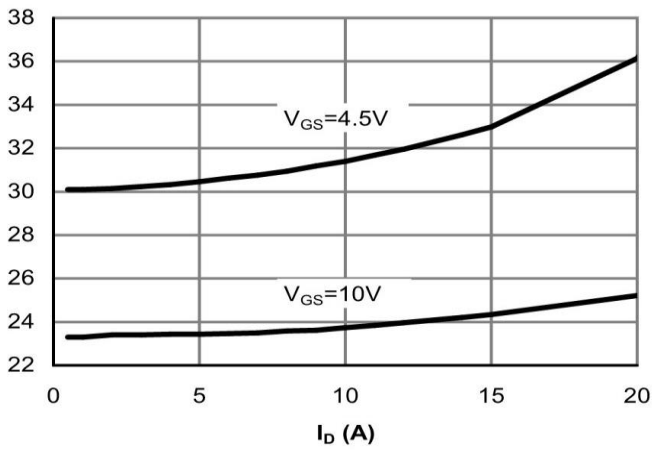


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

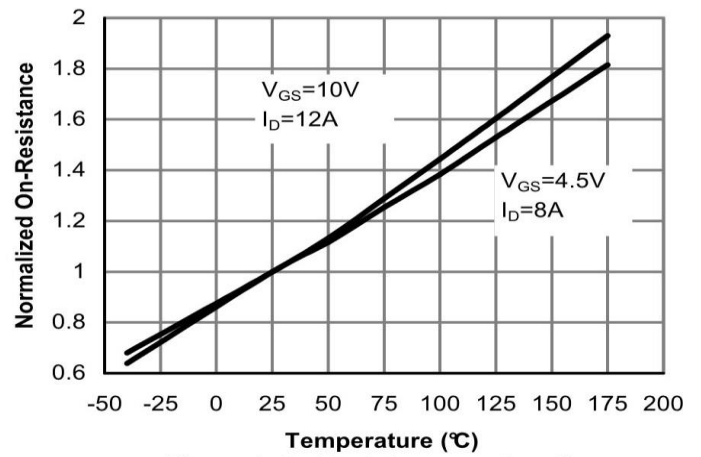
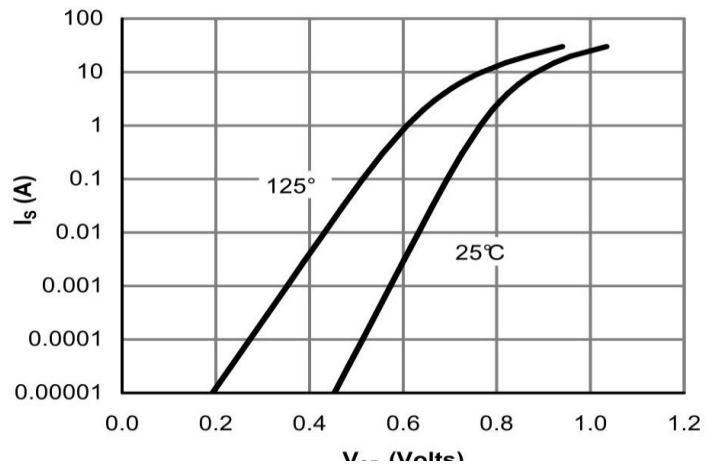
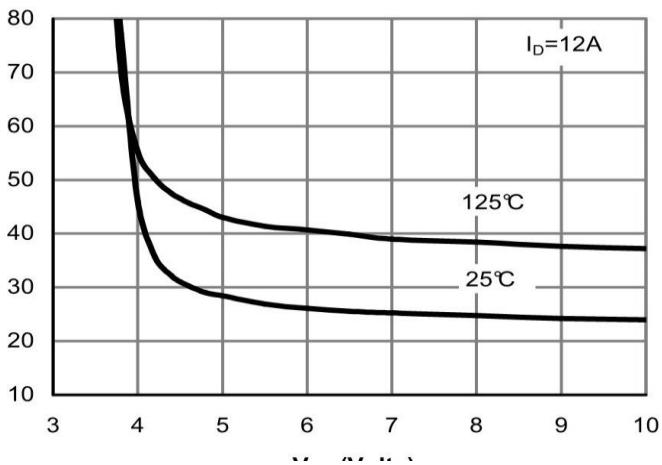


Figure 4: On-Resistance vs. Junction Temperature



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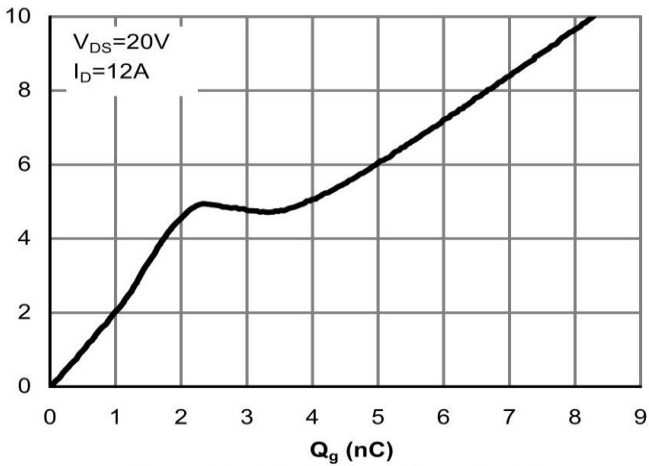


Figure 7: Gate-Charge Characteristics

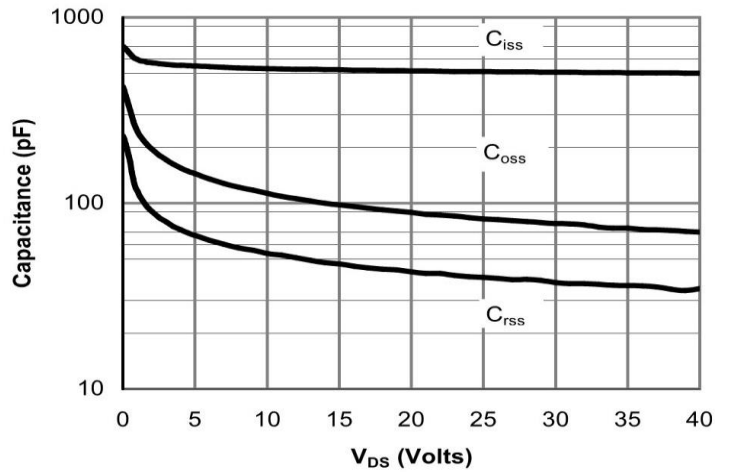


Figure 8: Capacitance Characteristics

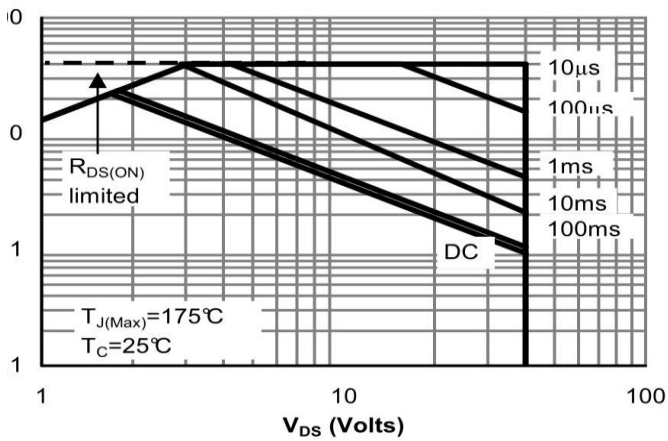


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

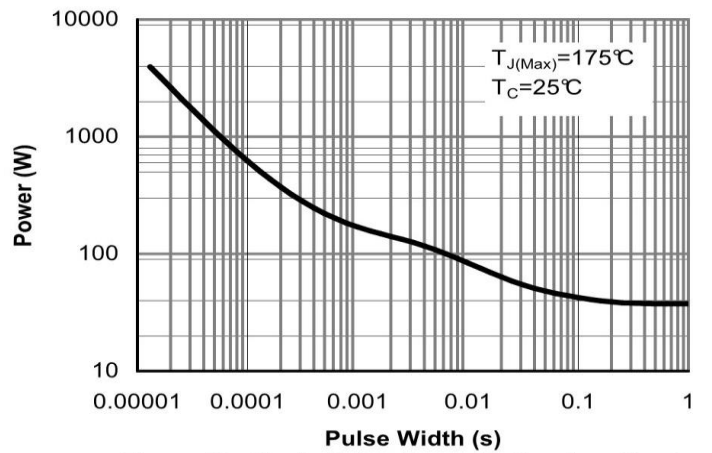
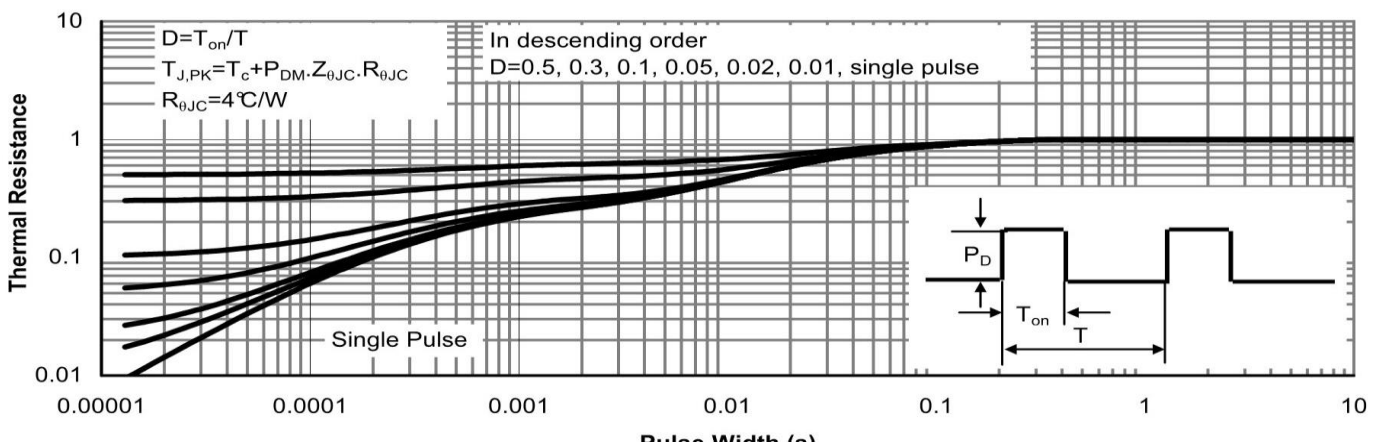


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)



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