

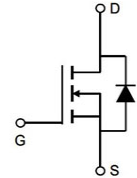
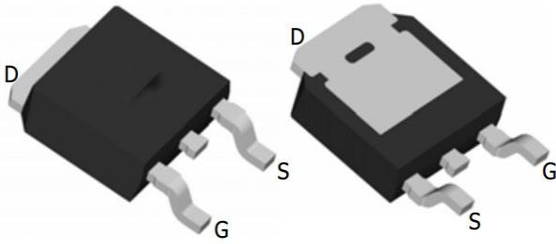
40V /20A Single N Power MOSFET
General Description

40V /20A Single N Power MOSFET

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

Pb-free lead plating; RoHS compliant

V_{DS}	40	V
$R_{DS(on),TYP@V_{GS}=10V}$	28.0	m Ω
$R_{DS(on),TYP@V_{GS}=4.5}$	44.0	m Ω
I_D	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 ^A	I_D	$T_A=25^\circ C$	A
		$T_A=70^\circ C$	
Pulsed Drain Current ^B	I_{DM}	32.0	
Avalanche Current ^C	I_{AR}	6.4	
Repetitive avalanche energy $L=0.1\text{mH}$ ^C	E_{AR}	14.7	mJ
Power Dissipation ^A	P_D	$T_A=25^\circ C$	W
		$T_A=70^\circ C$	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$R_{\theta JA}$	100	150	$^\circ C/W$
Maximum Junction-to-Ambient ^A		Steady State	200	240
Maximum Junction-to-Lead ^C	$R_{\theta JL}$	60	96	$^\circ C/W$



STATIC PARAMETERS

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

DYNAMIC PARAMETERS

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

SWITCHING PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Q _g (10V)	Total Gate Charge	V _{GS} = 10V, V _{DS} = 15V, I _D = 20A		8.3		nC
Q _g 4.5V)	Total Gate Charge			4.15		
Q _{gs}	Gate Source Charge			1.12		
Q _{gd}	Gate Drain Charge			1.6		
t _{D(on)}	Turn-On DelayTime	V _{GS} = 10V, V _{DS} = 15V, R _L = 0.75Ω, R _{GEN} = 3Ω		9		ns
t _r	Turn-On Rise Time			7.2		
t _{D(off)}	Turn-Off DelayTime			25.2		
t _f	Turn-Off Fall Time			8.1		
t _{rr}	Body Diode Reverse Recovery Time	I _F = -8A, dI/dt = 500A/µs		18		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F = 18A, dI/dt = 500A/µs		10		nC

DC ELECTRICAL AND THERMAL CHARACTERISTICS

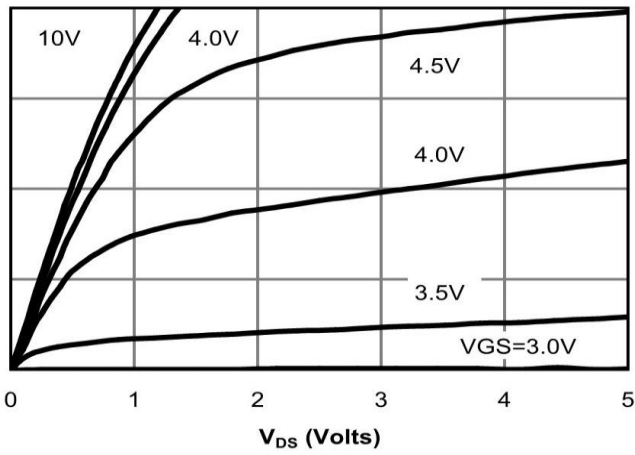


Figure 1: On-Region Characteristics

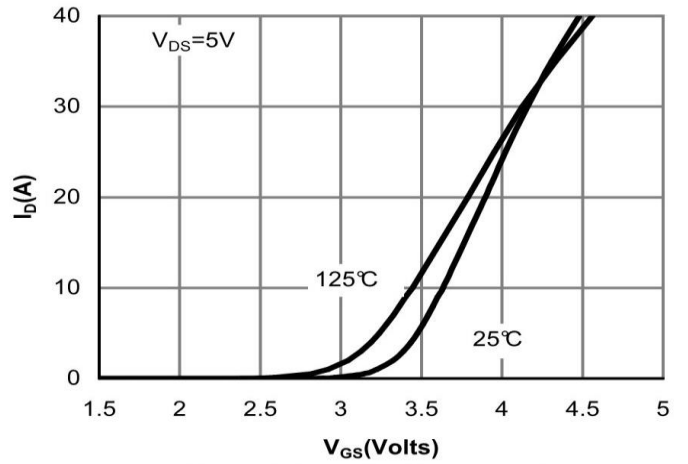


Figure 2: Transfer Characteristics

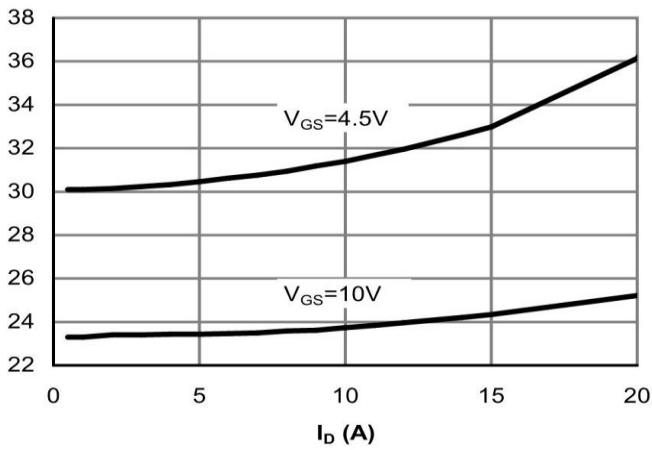


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

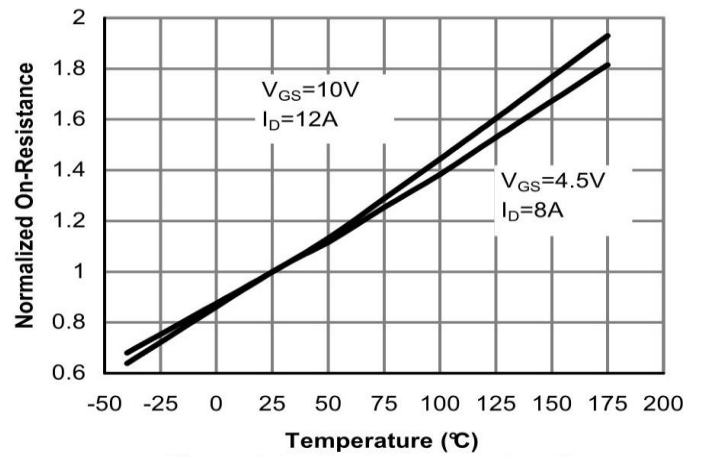
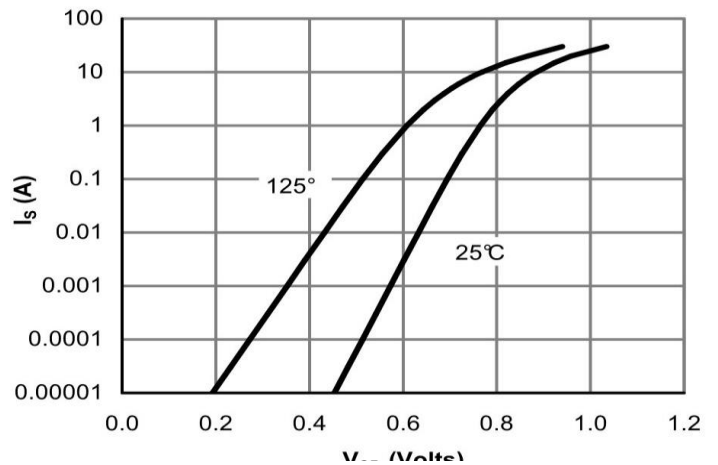
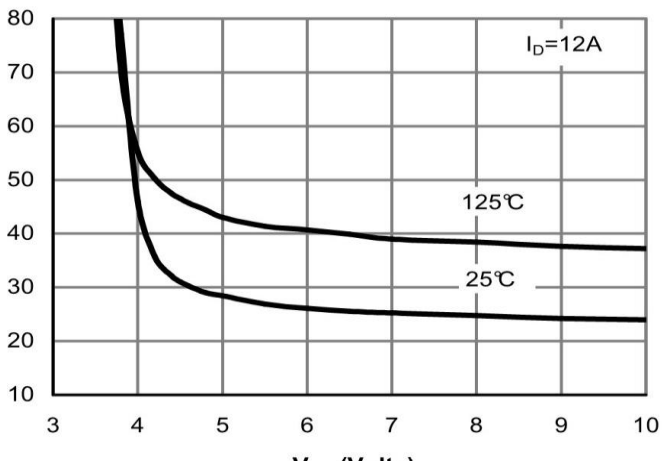


Figure 4: On-Resistance vs. Junction Temperature



MECHANICAL ELECTRICAL AND THERMAL CHARACTERISTICS

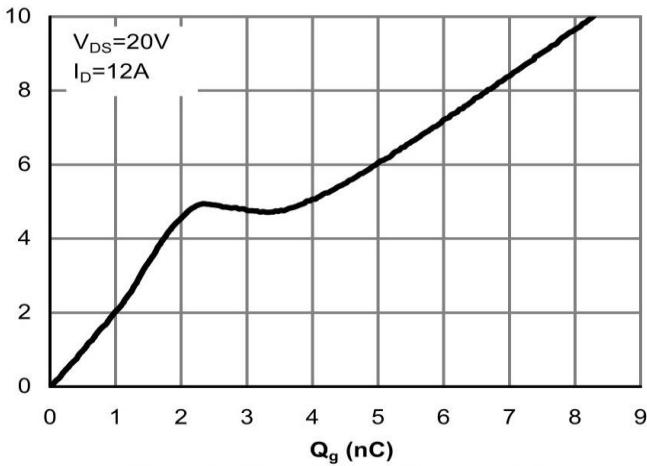


Figure 7: Gate-Charge Characteristics

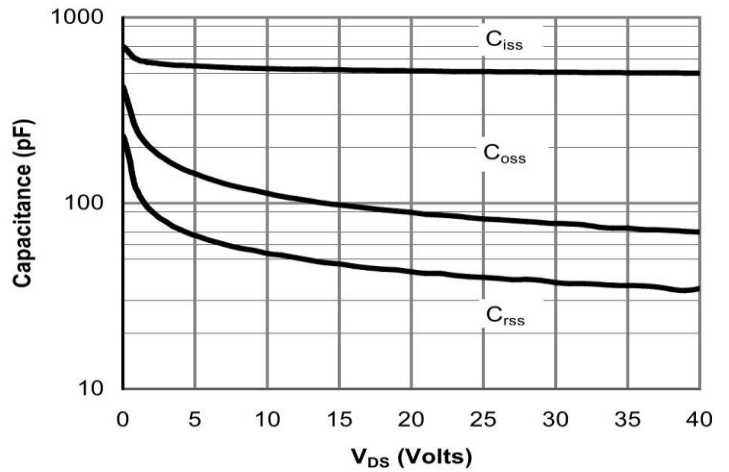


Figure 8: Capacitance Characteristics

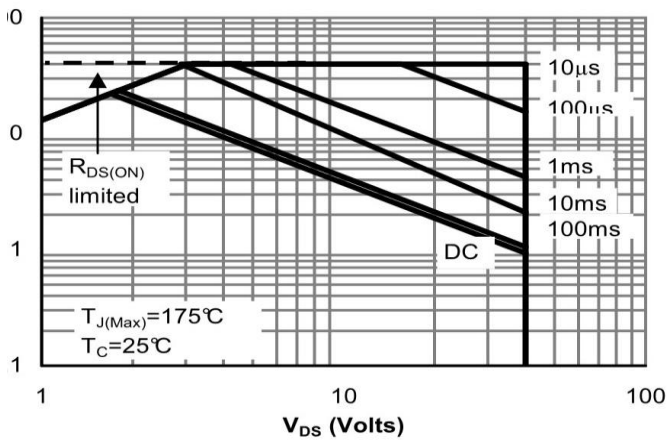


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

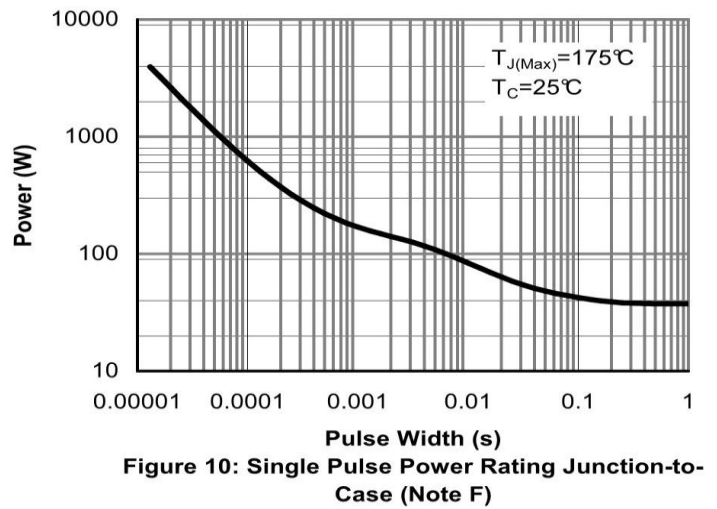


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

