

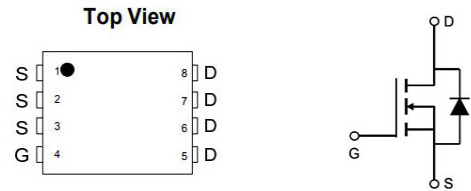
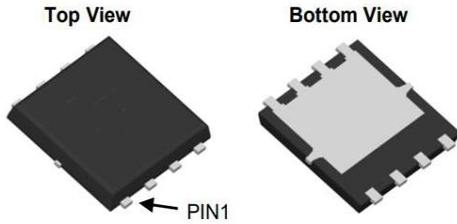
40V /100A Single N Power MOSFET
General Description

40V /100A Single N Power MOSFET

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

Pb-free lead plating; RoHS compliant

V_{DS}	40	V
$R_{DS(on),TYP@V_{GS}=10V}$	3.7	m Ω
$R_{DS(on),TYP@V_{GS}=4.5}$	4.8	m Ω
I_D	100	A



Part ID	Package Type	Marking	Tape and reel information
SM6590D1RL	DFN5x6	6590	3000


 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	$T_A=25^\circ\text{C}$	A
		$T_A=70^\circ\text{C}$	
Pulsed Drain Current ^B	I_{DM}	160.0	
Avalanche Current ^G	I_{AR}	32.0	
Repetitive avalanche energy $L=0.1\text{mH}$ ^G	E_{AR}	73.6	mJ
Power Dissipation ^A	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 ^A	$R_{\theta JA}$	3	5	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Ambient ^A		Steady State	7	9
Maximum Junction-to-Lead ^c	$R_{\theta JL}$	2	3	$^\circ\text{C}/\text{W}$

**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	1.2	1.7	2.3	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =20A		3.7	4.8	mΩ
		V _{GS} =4.5V, I _D =20A		4.8	6.5	
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =20A		44		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =219V		0.72	1	V
I _S	Maximum Body-Diode Continuous Current				100	A

DYNAMIC PARAMETERS

Symbol	Parameter	Conditions	Min	Typ	Max	Units
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz		8320	10150	pF
C _{oss}	Output Capacitance			1438	1768	pF
C _{rss}	Reverse Transfer Capacitance			85	101	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz			3.5	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		45		nC
Q _g 4.5V)	Total Gate Charge			22.5		
Q _{gs}	Gate Source Charge			4.9		
Q _{gd}	Gate Drain Charge			7		
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =0.75Ω, R _{GEN} =3Ω		13		ns
t _r	Turn-On Rise Time			10.4		
t _{D(off)}	Turn-Off DelayTime			36.4		
t _f	Turn-Off Fall Time			11.7		
t _{rr}	Body Diode Reverse Recovery Time	I _F =-8A, dI/dt=500A/μs		26		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =18A, dI/dt=500A/μs		83		nC

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

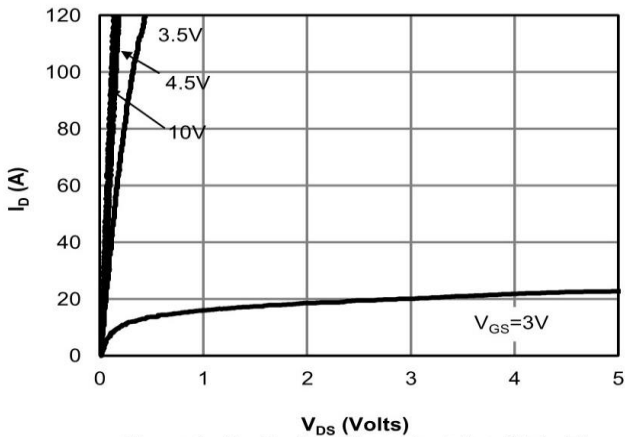


Figure 1: On-Region Characteristics (Note E)

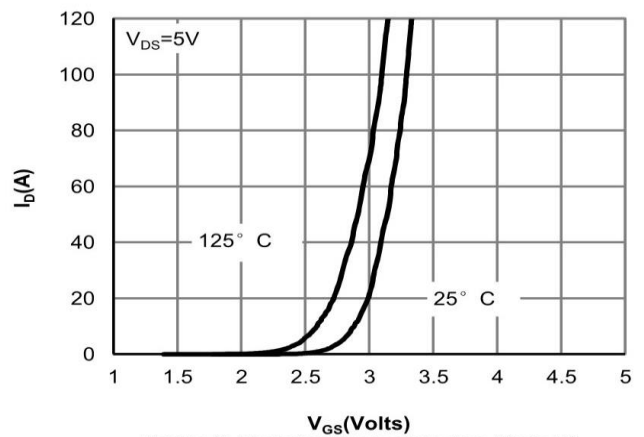


Figure 2: Transfer Characteristics (Note E)

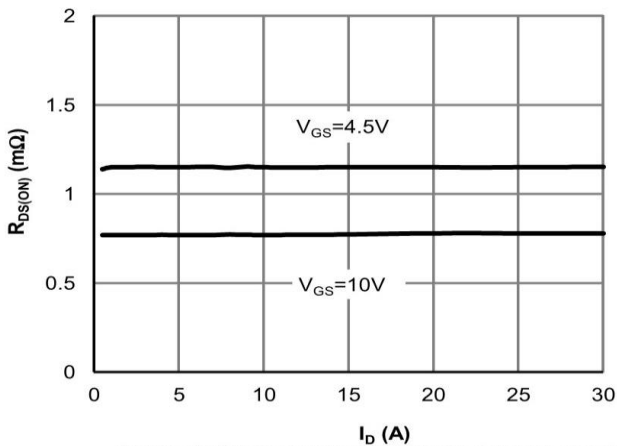


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

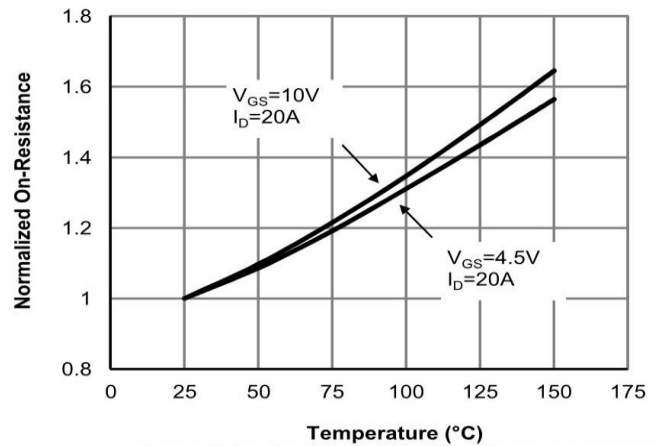


Figure 4: On-Resistance vs. Junction Temperature (Note E)

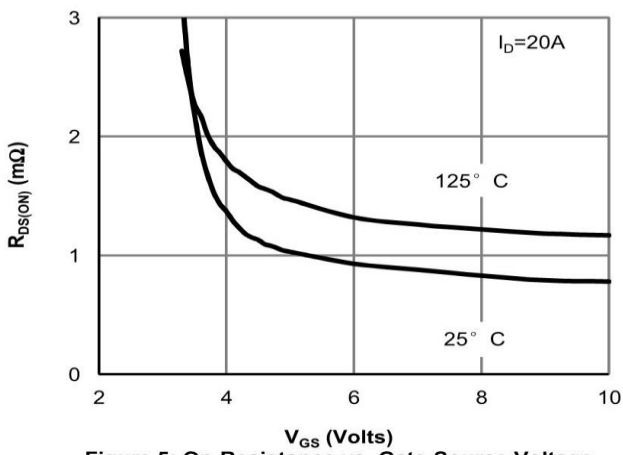


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

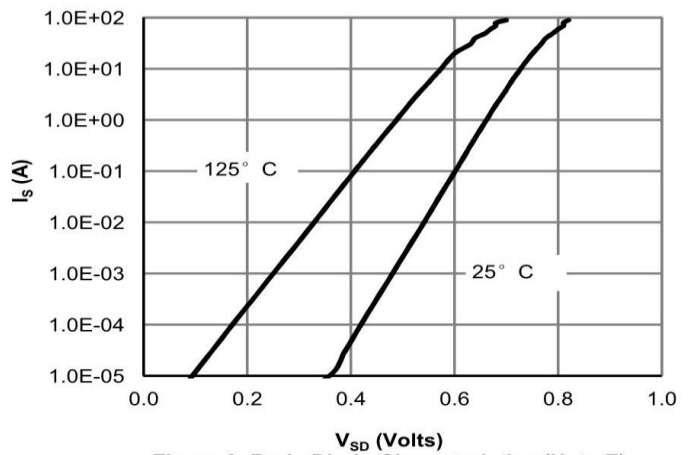


Figure 6: Body-Diode Characteristics (Note E)

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

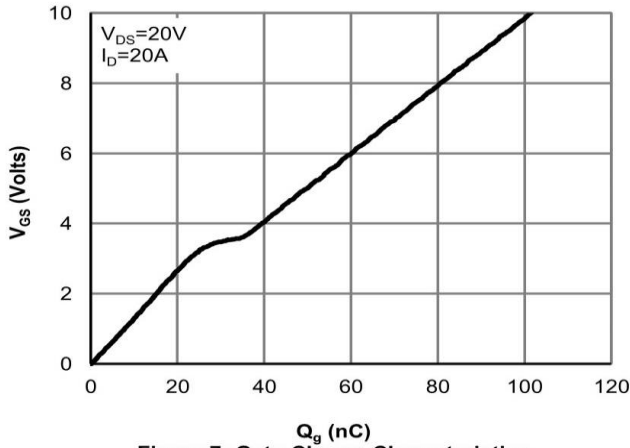


Figure 7: Gate-Charge Characteristics

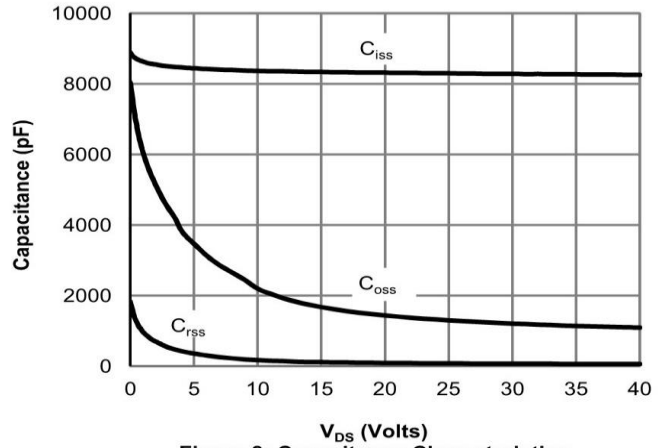


Figure 8: Capacitance Characteristics

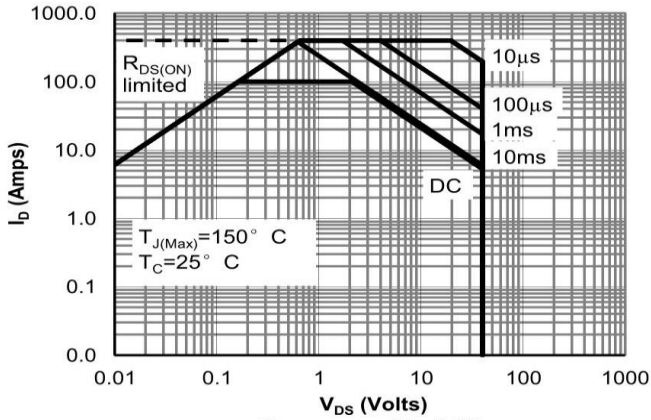


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

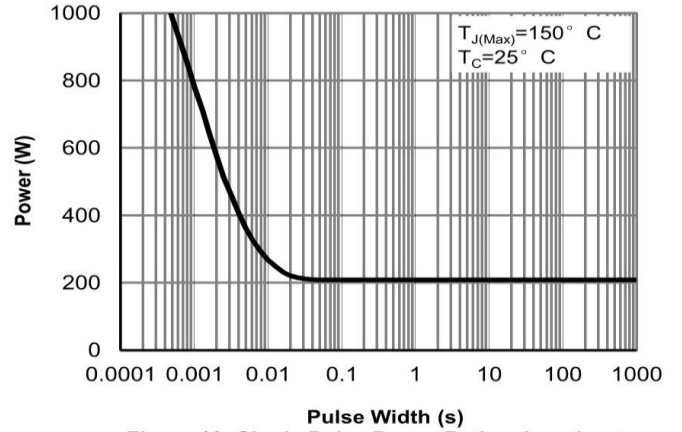


Figure 10: Single Pulse Power Rating Junction-to-Case (Note F)

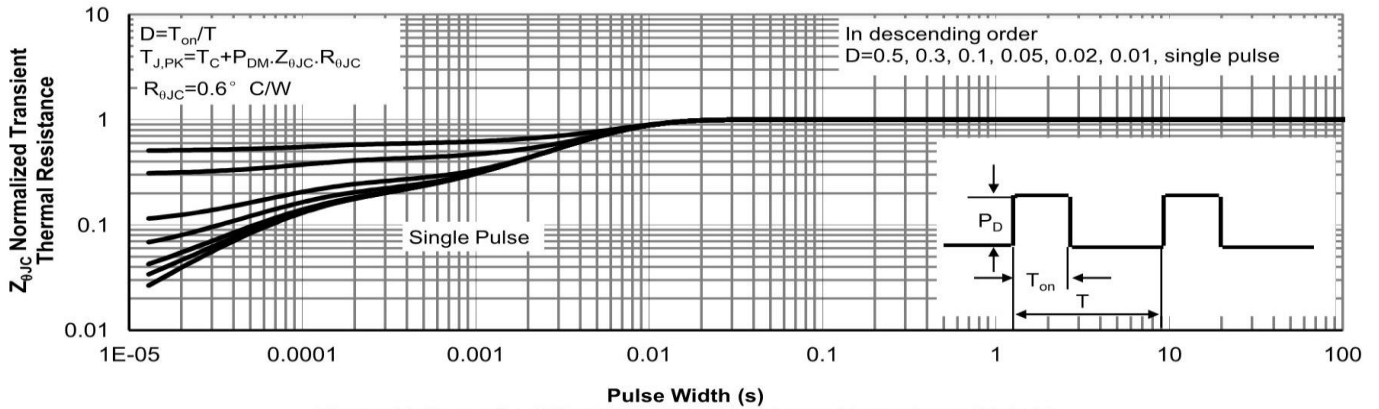


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

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