



SamHop Microelectronics Corp.

SDM8958

PRELIMINARY

Dual Enhancement Mode Field Effect Transistor (N and P Channel)

PRODUCT SUMMARY (N-Channel)		
V _{DSS}	I _D	R _{DS(ON)} (m Ω) MAX
30V	7A	32 @ V _{GS} = 10V
		50 @ V _{GS} = 4.5V

PRODUCT SUMMARY (P-Channel)		
V _{DSS}	I _D	R _{DS(ON)} (m Ω) MAX
-30V	-5A	52 @ V _{GS} = -10V
		90 @ V _{GS} = -5V



ABSOLUTE MAXIMUM RATINGS (T_A=25°C unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V _{DS}	30	-30	V
Gate-Source Voltage	V _{GS}	±20	±20	V
Drain Current-Continuous ^a @ T _J =125°C -Pulsed ^b	I _D	7.0	-5.0	A
	I _{DM}	28	-20	A
Drain-Source Diode Forward Current ^a	I _S	1.7	-1.7	A
Maximum Power Dissipation ^a	P _D	2.0		W
Operating Junction and Storage Temperature Range	T _J , T _{STG}	-55 to 150		°C

THERMAL CHARACTERISTICS

Thermal Resistance, Junction-to-Ambient ^a	R _{θJA}	62.5	°C/W
--	------------------	------	------

S DM8958

N-Channel ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 24V, V _{GS} = 0V			1	μA
Gate-Body Leakage	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
ON CHARACTERISTICS^b						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	1	1.8	3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 6.0A			32	m ohm
		V _{GS} = 4.5V, I _D = 5.0A			50	m ohm
On-State Drain Current	I _{D(ON)}	V _{DS} = 5V, V _{GS} = 10V	30			A
Forward Transconductance	g _{FS}	V _{DS} = 5V, I _D = 6.0A		16		S
DYNAMIC CHARACTERISTICS^c						
Input Capacitance	C _{ISS}	V _{DS} = 15V, V _{GS} = 0V f = 1.0MHz		510		pF
Output Capacitance	C _{OSS}			235		pF
Reverse Transfer Capacitance	C _{RSS}			56		pF
SWITCHING CHARACTERISTICS^c						
Turn-On Delay Time	t _{D(ON)}	V _{DD} = 15V, I _D = 1A, V _{GEN} = 10V, R _L = 15 Ω R _{GEN} = 10 Ω		21	40	ns
Rise Time	t _r			20	40	ns
Turn-Off Delay Time	t _{D(OFF)}			27	55	ns
Fall Time	t _f			115	230	ns
Total Gate Charge	Q _g	V _{DS} = 15V, I _D = 1A, V _{GS} = 10V		13	20	nC
		V _{DS} = 15V, I _D = 1A, V _{GS} = 4.5V		6	10	nC
Gate-Source Charge	Q _{gs}	V _{DS} = 15V, I _D = 1A, V _{GS} = 10V		2.1		nC
Gate-Drain Charge	Q _{gd}			2		nC

S DM8958

P-Channel ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DS}	$V_{GS} = 0V, I_D = -250\mu A$	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -24V, V_{GS} = 0V$			-1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
ON CHARACTERISTICS^b						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1	-1.7	-3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -4.5A$			52	m ohm
		$V_{GS} = -5V, I_D = -4A$			90	m ohm
On-State Drain Current	$I_{D(ON)}$	$V_{DS} = -5V, V_{GS} = -10V$	-20			A
Forward Transconductance	g_{FS}	$V_{DS} = -5V, I_D = -4.5A$		10		S
DYNAMIC CHARACTERISTICS^c						
Input Capacitance	C_{ISS}	$V_{DS} = -15V, V_{GS} = 0V$ $f = 1.0MHz$		860		pF
Output Capacitance	C_{OSS}			470		pF
Reverse Transfer Capacitance	C_{RSS}			180		pF
SWITCHING CHARACTERISTICS^c						
Turn-On Delay Time	$t_{D(ON)}$	$V_D = -15V,$ $R_L = 15\ \Omega$ $I_D = -1A,$ $V_{GEN} = -10V,$ $R_{GEN} = 10\ \Omega$		9	20	ns
Rise Time	t_r			10	40	ns
Turn-Off Delay Time	$t_{D(OFF)}$			37	90	ns
Fall Time	t_f			23	110	ns
Total Gate Charge	Q_g	$V_{DS} = -15V, I_D = -5.3A, V_{GS} = -10V$		15	20	nC
		$V_{DS} = -15V, I_D = -5.3A, V_{GS} = -4.5V$		8.7	10.5	nC
Gate-Source Charge	Q_{gs}	$V_{DS} = -15V, I_D = -5.3A,$ $V_{GS} = -10V$		3		nC
Gate-Drain Charge	Q_{gd}			4		nC

SDM8958

ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ ^c	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS^b						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 1.7A$	N-Ch	0.77	1.2	V
		$V_{GS} = 0V, I_S = -1.7A$	P-Ch	-0.82	-1.2	

Notes

- a. Surface Mounted on FR4 Board, $t \leq 10\text{sec}$.
- b. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
- c. Guaranteed by design, not subject to production testing.

N-Channel

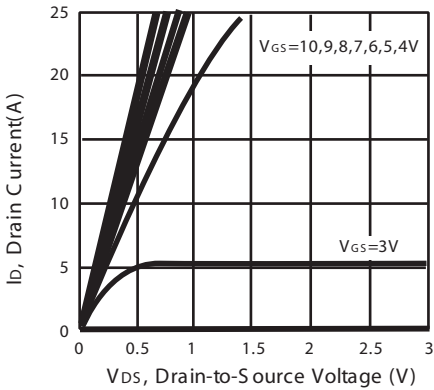


Figure 1. Output Characteristics

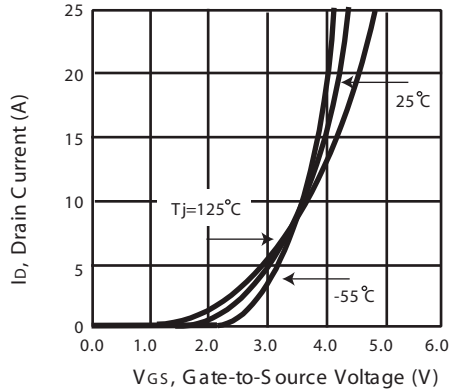


Figure 2. Transfer Characteristics

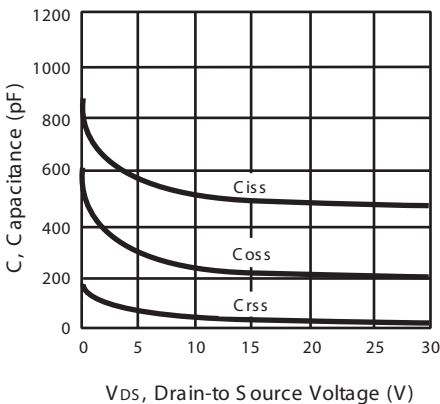


Figure 3. Capacitance

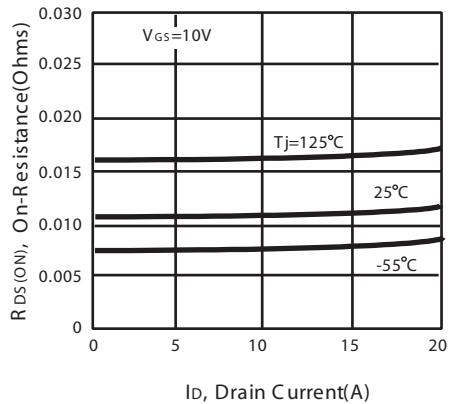
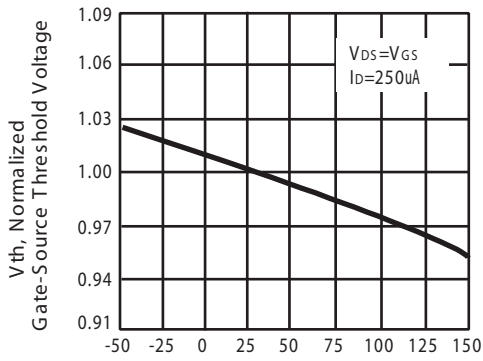


Figure 4. On-Resistance Variation with Drain Current and Temperature

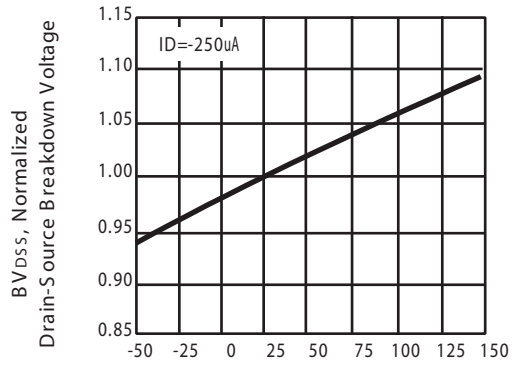
S DM8958

N-Channel



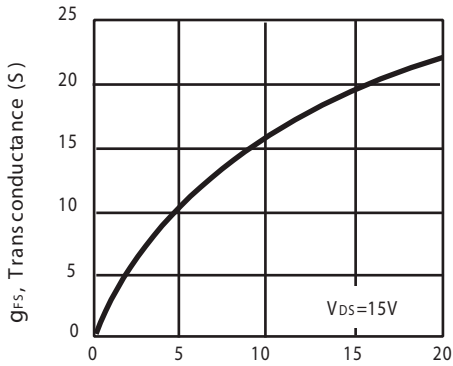
T_j , Junction Temperature ($^{\circ}C$)

Figure 5. Gate Threshold Variation with Temperature



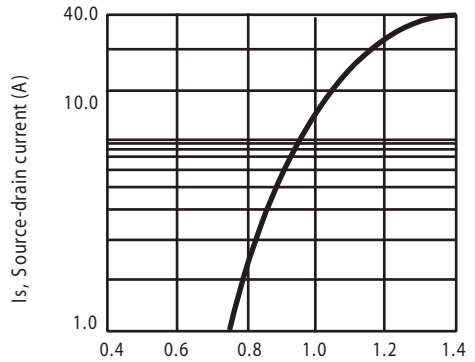
T_j , Junction Temperature ($^{\circ}C$)

Figure 6. Breakdown Voltage Variation with Temperature



I_{ds} , Drain-Source Current (A)

with Drain Current



V_{sd} , Body Diode Forward Voltage (V)

Figure 8. Body Diode Forward Voltage Variation with Source Current

S DM8958

P-Channel

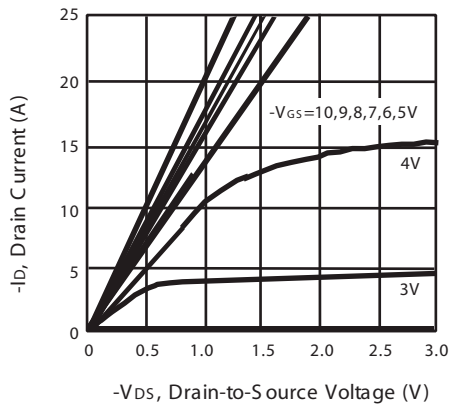


Figure 1. Output Characteristics

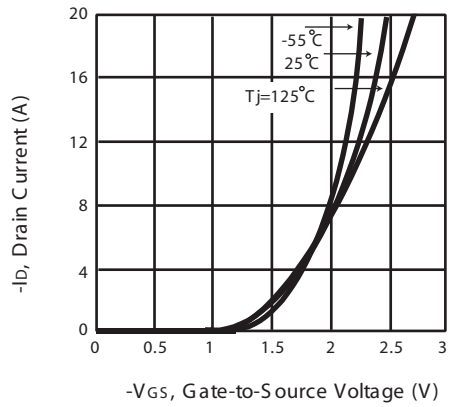


Figure 2. Transfer Characteristics

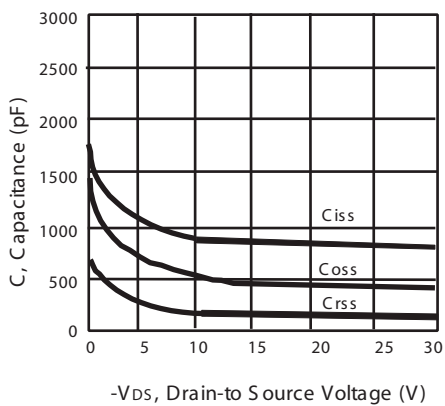


Figure 3. Capacitance

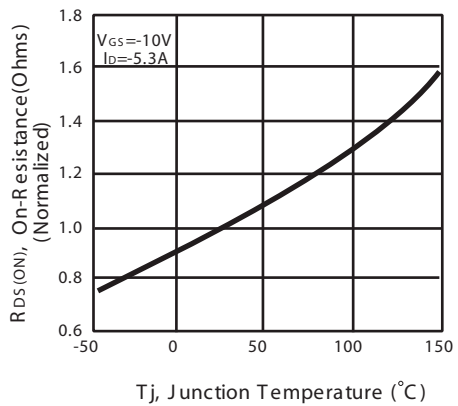


Figure 4. On-Resistance Variation with Temperature

S DM8958

P-Channel

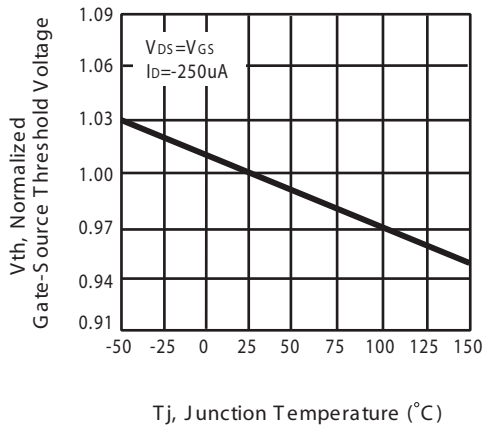


Figure 5. Gate Threshold Variation with Temperature

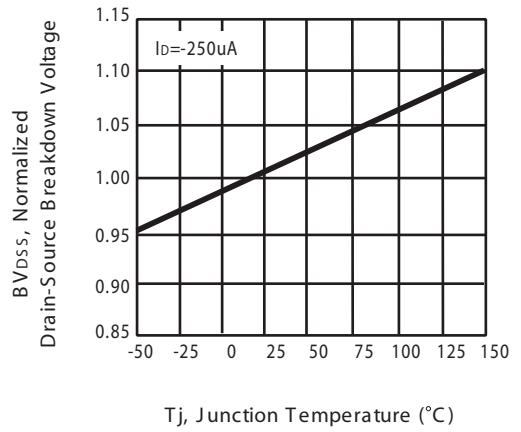


Figure 6. Breakdown Voltage Variation with Temperature

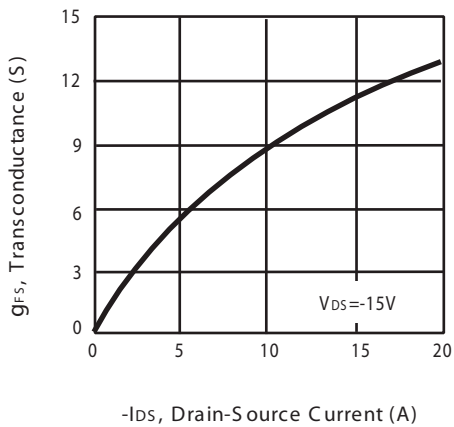


Figure 7. Transconductance Variation with Drain Current

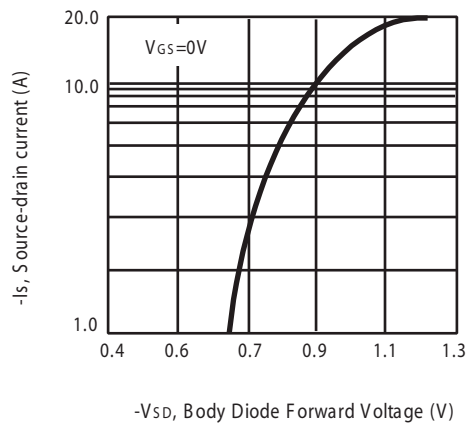
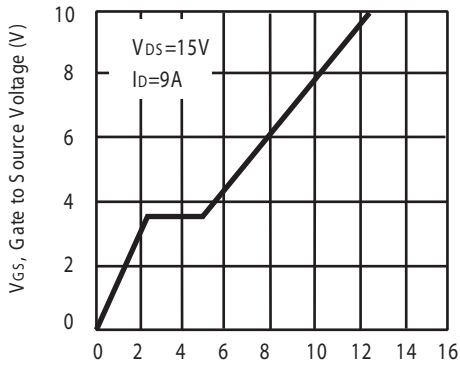


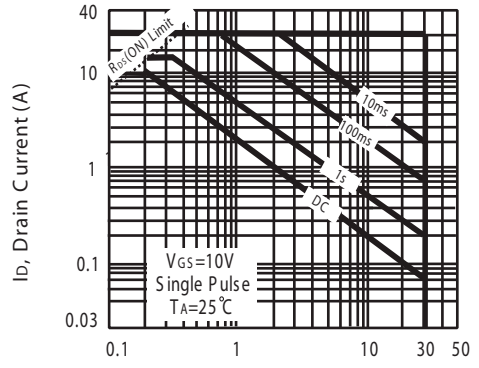
Figure 8. Body Diode Forward Voltage Variation with Source Current

S DM8958

N-Channel

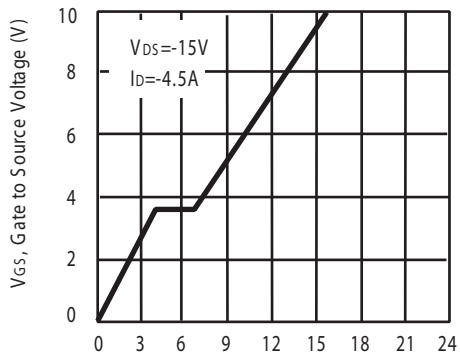


Qg, Total Gate Charge (nC)
Figure 9. Gate Charge

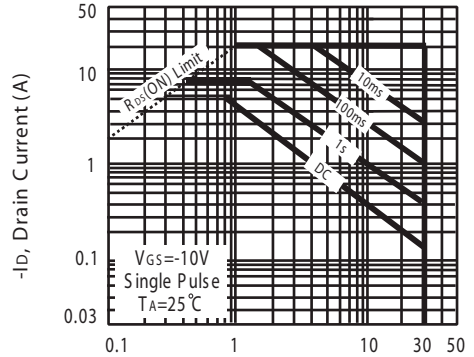


Vds, Drain-Source Voltage (V)
Figure 10. Maximum Safe Operating Area

P-Channel



Qg, Total Gate Charge (nC)
Figure 9. Gate Charge



-Vds, Drain-Source Voltage (V)
Figure 10. Maximum Safe Operating Area

S DM8958

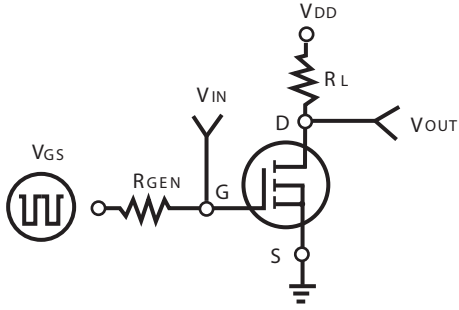


Figure 11. Switching Test Circuit

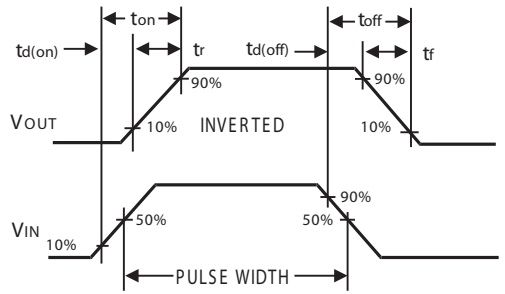


Figure 12. Switching Waveforms

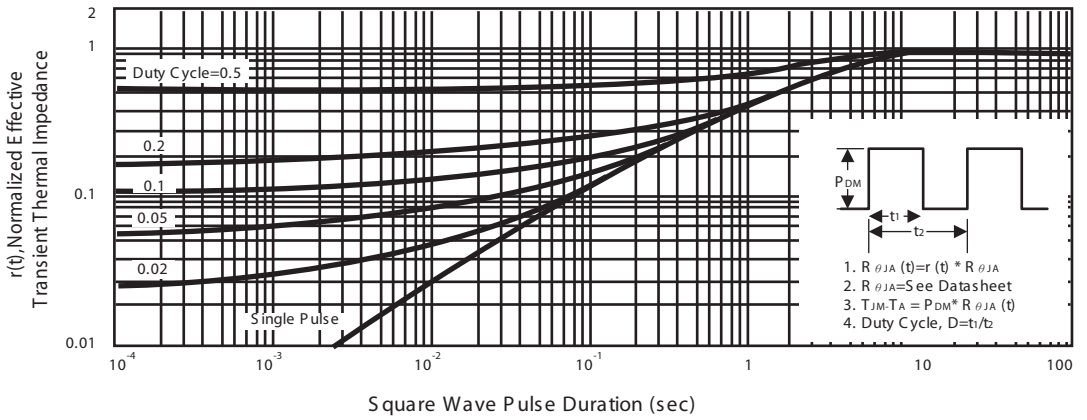


Figure 13. Normalized Thermal Transient Impedance Curve