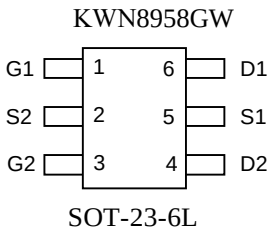
Complementary High Density Trench MOSFET

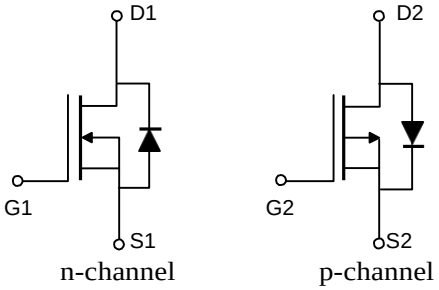
PRODUCT SUMMARY (N-Channel)

V_{DSS}	I_D	$R_{DS(on)}$ (mΩ) Max
30V	4.5A	30 @ V_{GS} = 10V
	3.5A	44 @ V_{GS} = 4.5V

PRODUCT SUMMARY (P-Channel)

V_{DSS}	I_D	$R_{DS(on)}$ (mΩ) Max
-30V	-3.5A	70 @ V_{GS} = -10V
	-3.0A	95 @ V_{GS} = -4.5V





ABSOLUTE MAXIMUM RATINGS (T_A = 25 ℃ 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_A = 25 ℃		I_D	4.5	3.5	A
-Pulse[b]		I_{DM}	18	14	A
Drain-Source Diode Forward Current [a]		I_S	2.5	-1.9	A
Maximum Power Dissipation [a]	TA=25℃	P_D	1.25		W
	TA=75℃		0.75		
Operating Junction and Storage Temperature Range		T_J,T_{STG}	- 55 to 150		℃

THERMAL CHARACTERISTICS

Thermal Resistance,Junction-to-Ambient[a]	R_{thJA}	100	℃/W

Note：
a. Surface Mounted on FR4 Board , t ≤ 5sec .
b. Pulse width limited by maximum junction temperature.

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 = 250uA	30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24V , V_{GS} = 0V			1	uA
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 = 250uA	1	1.5	3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 10V , I_D = 4.5A		24	30	mΩ
		V_{GS} = 4.5V , I_D = 3.5A		35	44	
Forward Transconductance	g_{fs}	V_{DS} = 15V , I_D = 4.5A		8.3		S
DRAIN-SOURCE DIODE CHARACTERISTICS[b]						
Diode Forward Voltage	V_{SD}	V_{GS} = 0V , I_S = 1.0A		0.76	1.0	V
DYNAMIC CHARACTERISTICS[c]						
Input Capacitance	C_{ISS}	V_{DS} = 10V , V_{GS} = 0V f = 1.0MHz		402		pF
Output Capacitance	C_{OSS}			96		pF
Reverse Transfer Capacitance	C_{RSS}			73		pF
SWITCHING CHARACTERISTICS[c]						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} = 15V , I_D = 1A V_{GEN} = 10V R_L = 15 ohm R_{GEN} = 6 ohm		8.0		ns
Rise Time	t_r			2.4		ns
Turn-Off Delay Time	$t_{D(OFF)}$			20.6		ns
Fall Time	t_f			3.8		ns
Total Gate Charge	Q_g	V_{DS} = 10V I_D = 1A V_{GS} = 10V		8.4		nC
Gate-Source Charge	Q_{gs}			1.7		nC
Gate-Drain Charge	Q_{gd}			1.3		nC

Note
b. Pulse Test Pulse width ≤ 300us , Duty Cycle ≤ 2% .
c. Guaranteed by design , not subject to production testing .

P-Channel ELECTRICAL CHARACTERISTICS (TA = 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 = -250uA	-30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -24V , V_{GS} = 0V			-1	uA
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 = -250uA	-1	-1.4	-3	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = -10V , I_D = -3.5A		56	70	mΩ
		V_{GS} = -4.5V , I_D = -3.0A		73	95	
Forward Transconductance	g_{fs}	V_{DS} = -15V , I_D = -3.5A		10.2		S
DRAIN-SOURCE DIODE CHARACTERISTICS[b]						
Diode Forward Voltage	V_{SD}	V_{GS} = 0V , I_S = -1.9A		-0.85	-1.3	V
DYNAMIC CHARACTERISTICS[c]						
Input Capacitance	C_{ISS}	V_{DS} = -15V , V_{GS} = 0V f = 1.0MHz		490		pF
Output Capacitance	C_{OSS}			66		pF
Reverse Transfer Capacitance	C_{RSS}			53		pF
SWITCHING CHARACTERISTICS[c]						
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} = -15V , I_D = -1A V_{GEN} = -10V R_L = 15 ohm R_{GEN} = 6 ohm		4.4		ns
Rise Time	t_r			2.2		ns
Turn-Off Delay Time	$t_{D(OFF)}$			22		ns
Fall Time	t_f			4.2		ns
Total Gate Charge	Q_g	V_{DS} = -15V I_D = -1A V_{GS} = -10V		10		nC
Gate-Source Charge	Q_{gs}			1.5		nC
Gate-Drain Charge	Q_{gd}			1.4		nC

Note：
b. Pulse Test：Pulse width ≤ 300us , Duty Cycle ≤ 2% .
c. Guaranteed by design , not subject to production testing .

N-Channel:

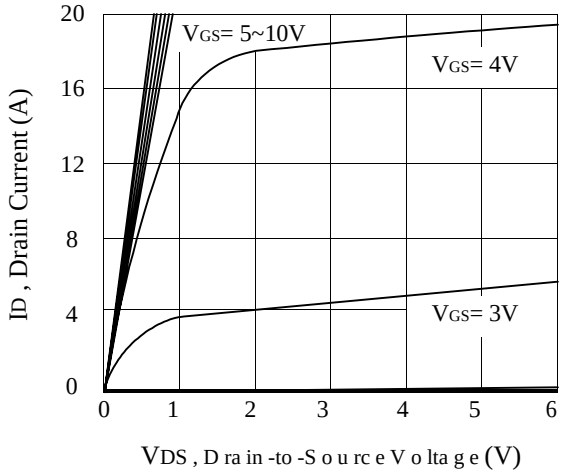


Figure 1. Output Characteristics

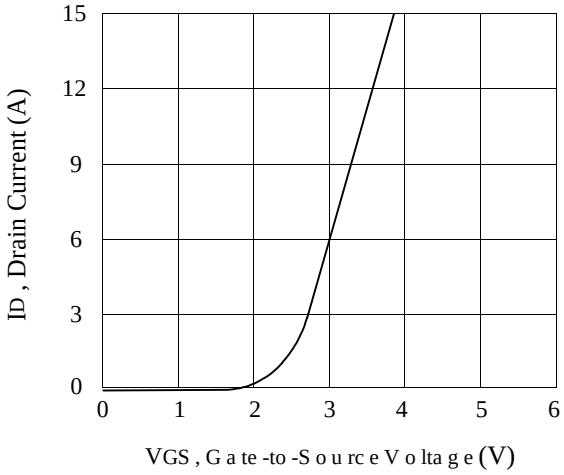


Figure 2. Transfer Characteristics

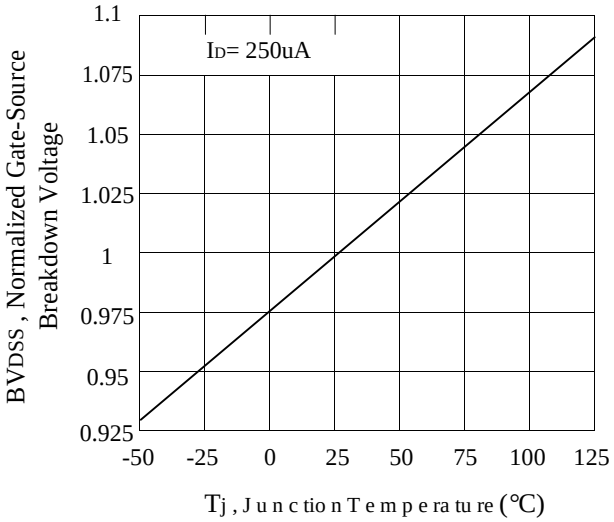


Figure 3. Breakdown Voltage Variation with Temperature

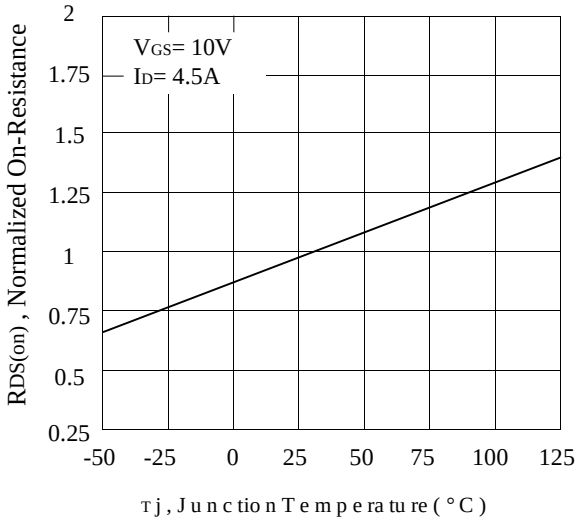


Figure 4. On-Resistance Variation with Temperature

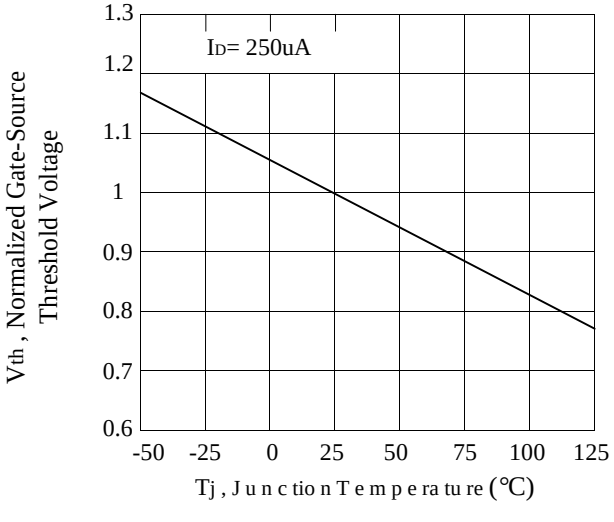


Figure 5 .Gate Threshold Variation with Temperature

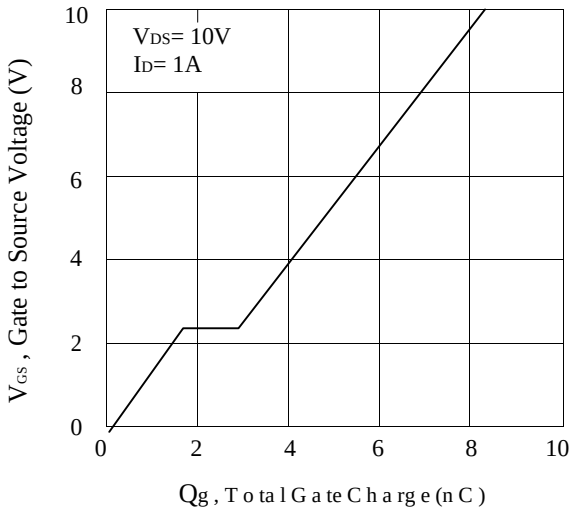
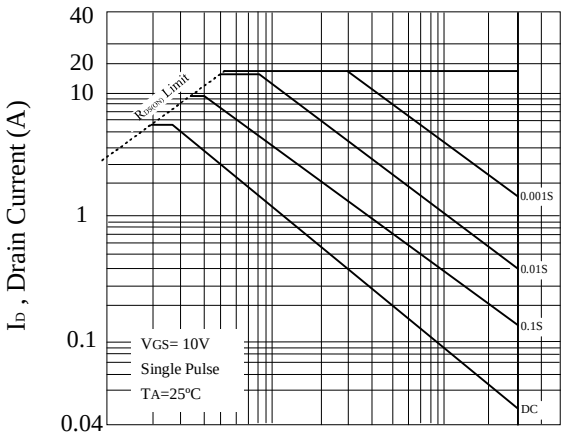
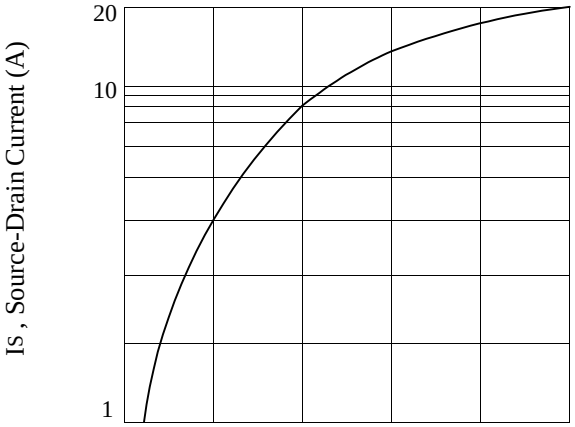


Figure 6 . Gate Charge



VDS , Drain-Source Voltage (V)

Figure 7. Maximum Safe Operating Area



VSD , Body Diode Forward Voltage (V)

Figure 8. Body Diode Forward Voltage Variation with Source Current

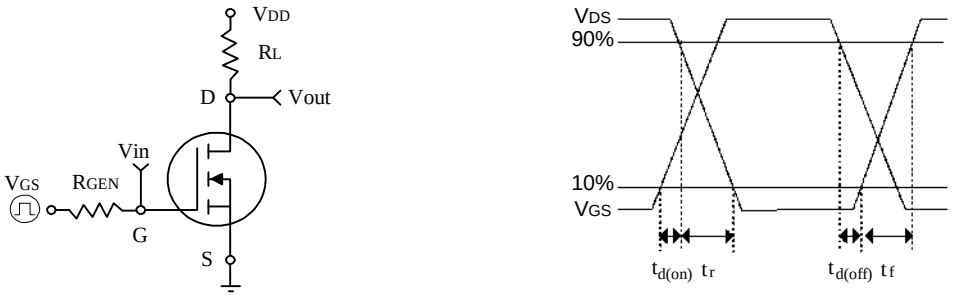
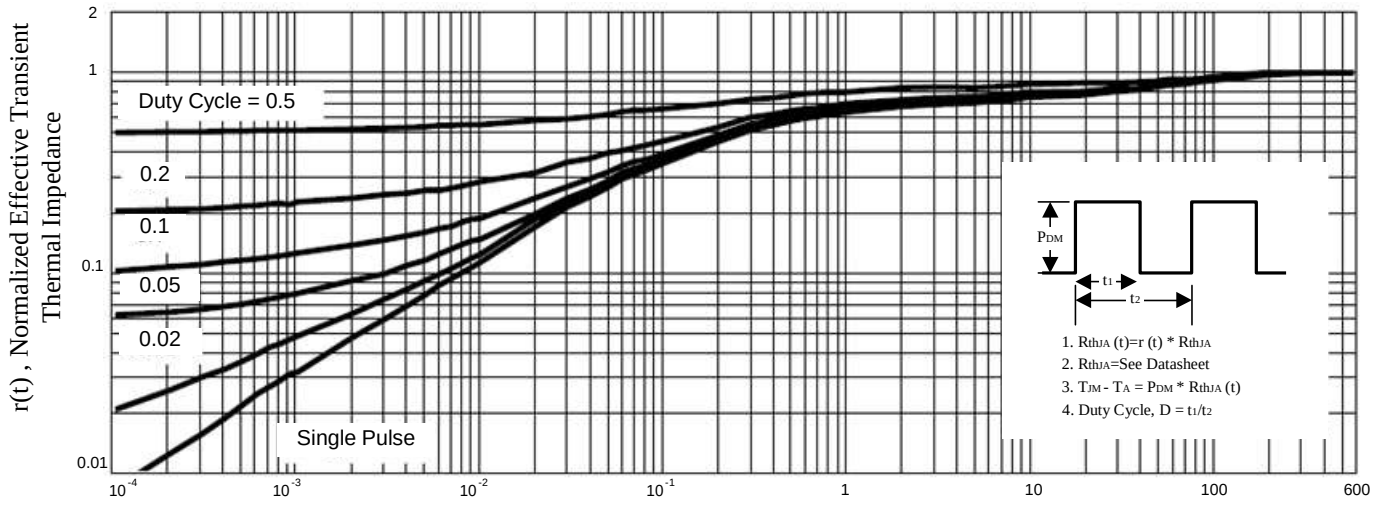


Figure 9. Switching Test Circuit and Switching Waveforms



Square Wave Pulse Duration (sec)

Figure 10. Normalized Thermal Transient Impedance Curve

P-Channel:

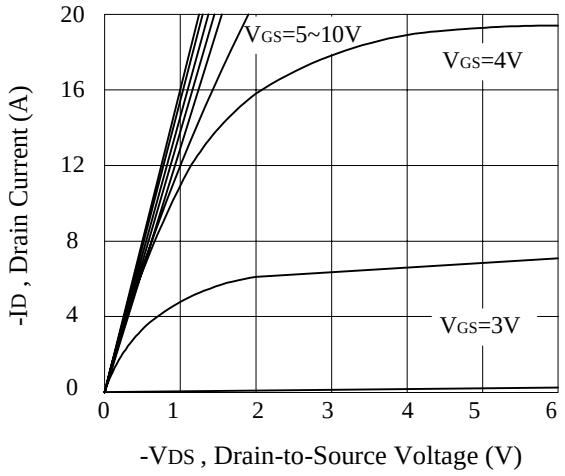


Figure 11. Output Characteristics

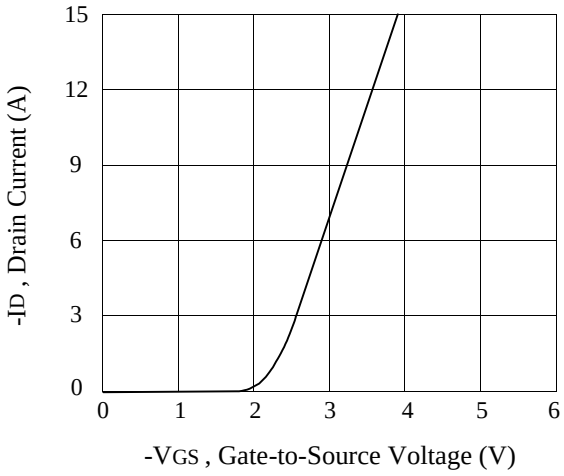


Figure 12. Transfer Characteristics

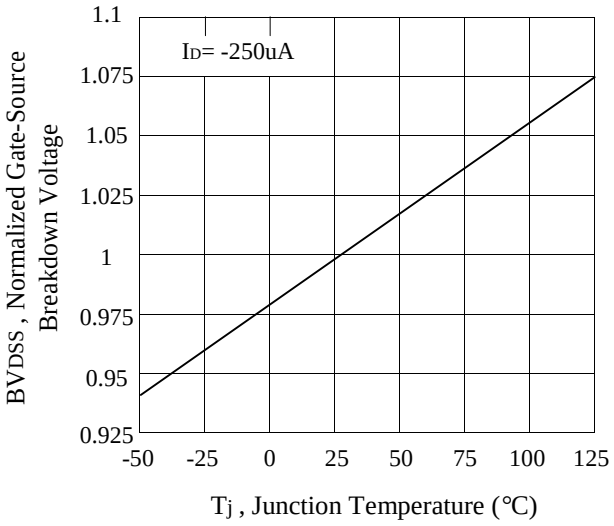


Figure 13. Breakdown Voltage Variation with Temperature

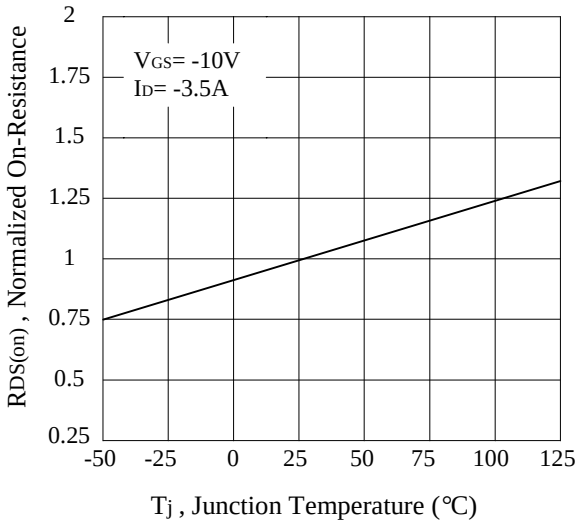


Figure 14. On-Resistance Variation with Temperature

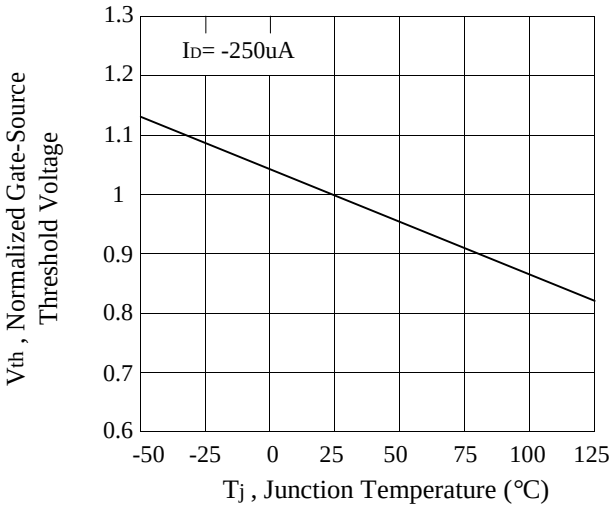


Figure 15. Gate Threshold Variation with Temperature

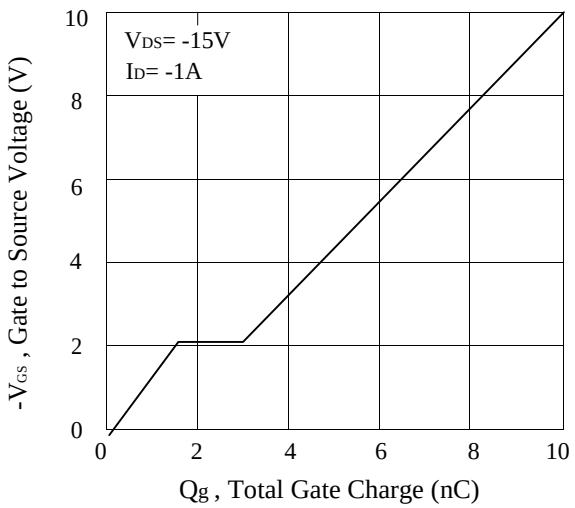


Figure 16. Gate Charge

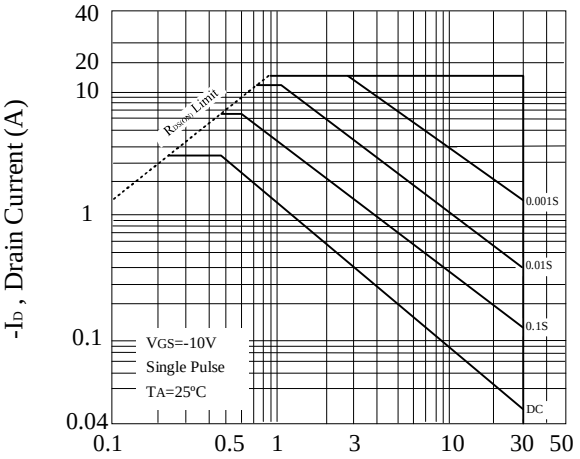


Figure 17. Maximum Safe Operating Area

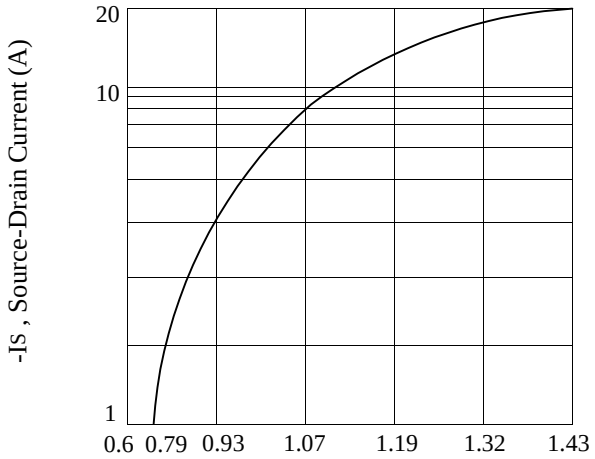


Figure 18. Body Diode Forward Voltage Variation with Source Current

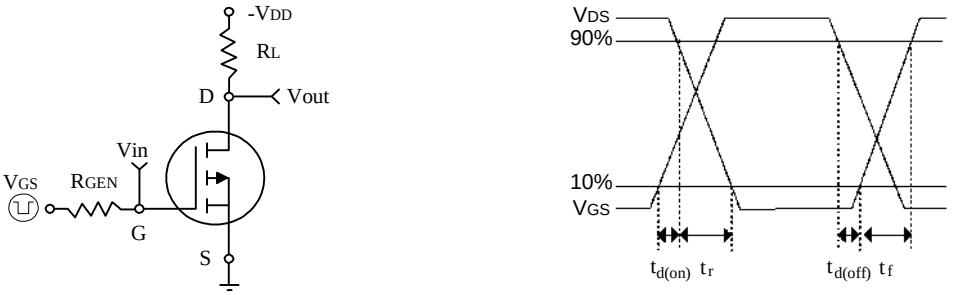


Figure 19. Switching Test Circuit and Switching Waveforms

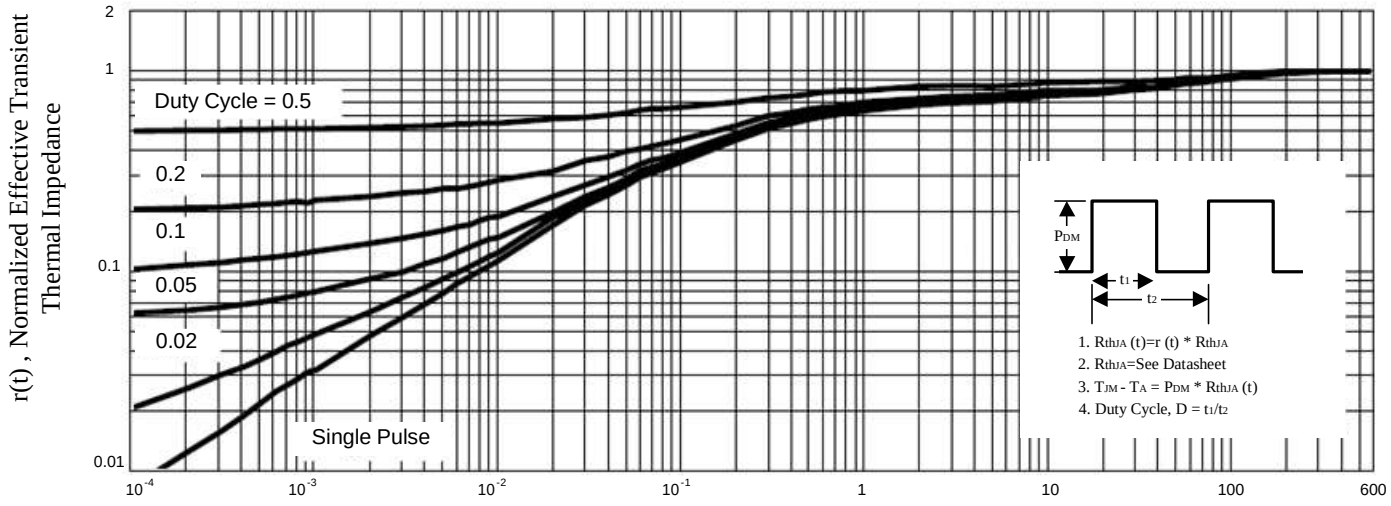


Figure 20. Normalized Thermal Transient Impedance Curve