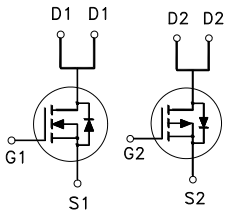
NIKO-SEM

N- & P-Channel Enhancement Mode Field Effect Transistor

PB502CW
PDFN 2x2S
Halogen-Free & Lead-Free

PRODUCT SUMMARY

	$V_{(BR)DSS}$	$R_{DS(ON)}$	I_D
N-Channel	20V	30mΩ	6A
P-Channel	-20V	75mΩ	-3.8A

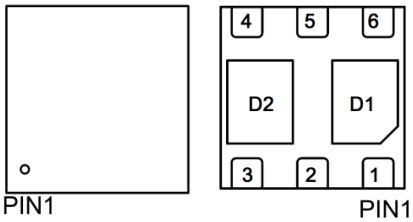


Features

- Pb−Free, Halogen Free and RoHS compliant.
- Low $R_{DS(on)}$ to Minimize Conduction Losses.
- Ohmic Region Good $R_{DS(on)}$ Ratio.
- Optimized Gate Charge to Minimize Switching Losses.

Applications

- Protection Circuits Applications.
- Logic/Load Switch Circuits Applications.
- DC Motor for BLDC Applications.



1 : S1. 4 : S2.
2 : G1. 5 : G2.
3 : D2. 6 : D1.

100% UIS Tested
100% Rg Tested

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	N-Channel	P-Channel	UNITS
Drain-Source Voltage		V_{DS}	20	-20	V
Gate-Source Voltage		V_{GS}	±8	±8	V
Continuous Drain Current	T_A = 25 °C	I_D	6	-3.8	A
	T_A = 70 °C		4.8	-3	
Pulsed Drain Current[1]		I_{DM}	20	-15	
Power Dissipation[3]	T_A = 25 °C	P_D	1.9	1.9	W
	T_A = 70 °C		1.2	1.2	
Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150		°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE		SYMBOL		TYPICAL	MAXIMUM	UNITS
Junction-to-Ambient[2]	t ≦10s	$R_{\theta JA}$	N-ch		63	°C / W
			P-ch		63	
Junction-to-Ambient[2]	Steady-State		N-ch		97	
			P-ch		97	

[1]Pulse width limited by maximum junction temperature.
[2]The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C.
[3]The Power dissipation is based on $R_{\theta JA}$ t ≦10s value.

ELECTRICAL CHARACTERISTICS (T_J = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNIT
STATIC							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	N-Ch	20			V
		V_{GS} = 0V, I_D = -250μA	P-Ch	-20			
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	N-Ch	0.5	0.7	1	
		V_{DS} = V_{GS}, I_D = -250μA	P-Ch	-0.3	-0.6	-1	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±8V	N-Ch			±100	nA
		V_{DS} = 0V, V_{GS} = ±8V	P-Ch			±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16V, V_{GS} = 0V	N-Ch			1	μA
		V_{DS} = -16V, V_{GS} = 0V	P-Ch			-1	
		V_{DS} = 10V, V_{GS} = 0V, T_J = 55 °C	N-Ch			10	
		V_{DS} = -10V, V_{GS} = 0V, T_J = 55 °C	P-Ch			-10	
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 5A	N-Ch		25	30	mΩ
		V_{GS} = -4.5V, I_D = -2.5A	P-Ch		60	75	
		V_{GS} = 2.5V, I_D = 4.5A	N-Ch		29	38	
		V_{GS} = -2.5V, I_D = -2A	P-Ch		73	90	
		V_{GS} = 1.8V, I_D = 2A	N-Ch		36	55	
		V_{GS} = -1.8V, I_D = -1A	P-Ch		91	125	
Forward Transconductance[1]	g_{fs}	V_{DS} = 10V, I_D = 5A	N-Ch		26		S
		V_{DS} = -10V, I_D = -2.5A	P-Ch		10		
DYNAMIC							
Input Capacitance	C_{iss}	N-Channel V_{GS} = 0V, V_{DS} = 10V, f = 1MHz P-Channel V_{GS} = 0V, V_{DS} = -10V, f = 1MHz	N-Ch		510		pF
			P-Ch		588		
Output Capacitance	C_{oss}		N-Ch		83		
			P-Ch		82		
Reverse Transfer Capacitance	C_{rss}		N-Ch		67		
			P-Ch		61		
Gate Resistance	R_g	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz	N-Ch		1.9		Ω
			P-Ch		7.4		

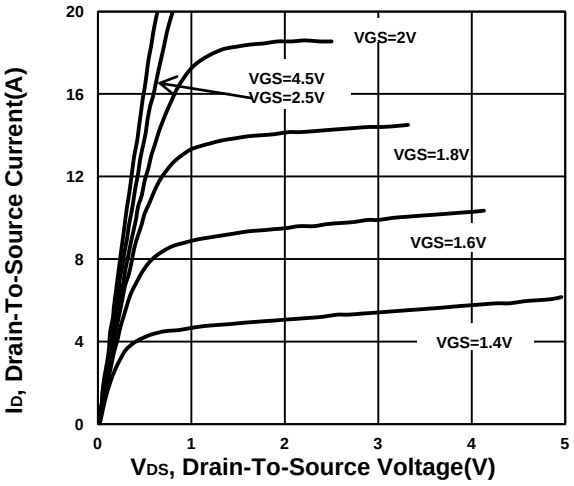
Total Gate Charge[2]	Q_g	N-Channel V_{DS} = 10V , V_{GS} = 4.5V, I_D = 5A P-Channel V_{DS} = -10V , V_{GS} = -4.5V, I_D = -2.5A	N-Ch P-Ch		7.3 7.3		nC
Gate-Source Charge[2]	Q_{gs}		N-Ch P-Ch		0.6 0.7		
Gate-Drain Charge[2]	Q_{gd}		N-Ch P-Ch		2.5 1.9		
Turn-On Delay Time[2]	$t_{d(on)}$	N-Channel V_{DS} = 10V, $I_D \cong$ 5A, V_{GS} = 4.5V, R_{GEN} = 6Ω P-Channel V_{DS} = -10V, $I_D \cong$ -2.5A, V_{GS} = -4.5V, R_{GEN} = 6Ω	N-Ch P-Ch		11 8.2		nS
Rise Time[2]	t_r		N-Ch P-Ch		94 33		
Turn-Off Delay Time[2]	$t_{d(off)}$		N-Ch P-Ch		26 43		
Fall Time[2]	t_f		N-Ch P-Ch		69 54		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_J = 25 °C)							
Continuous Current	I_S		N-Ch P-Ch			1.9 -1.6	A
Forward Voltage[1]	V_{SD}	I_F = 5A, V_{GS} = 0V I_F = -2.5A, V_{GS} = 0V	N-Ch P-Ch			1 -1.2	V
Reverse Recovery Time	t_{rr}	I_F = 5A, dI_F/dt = 100A / µS I_F = -2.5A, dI_F/dt = 100A / µS	N-Ch P-Ch		9 10		nS
Reverse Recovery Charge	Q_{rr}		N-Ch P-Ch		3 3		nC

[1]Pulse test : Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.

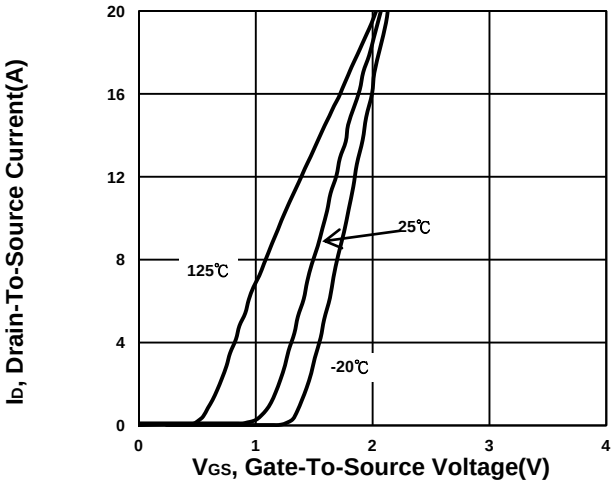
TYPICAL PERFORMANCE CHARACTERISTICS

N-CHANNEL

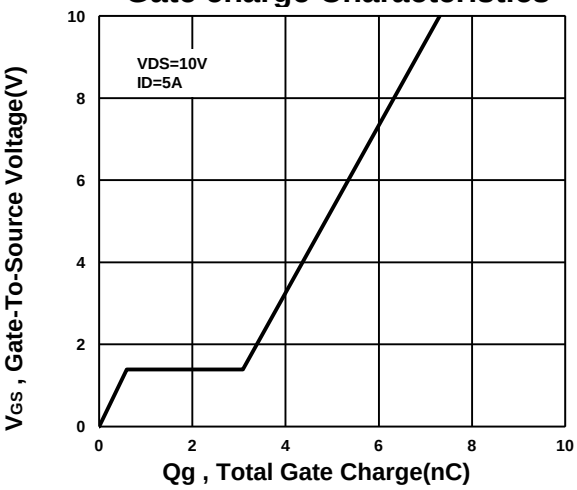
Output Characteristics



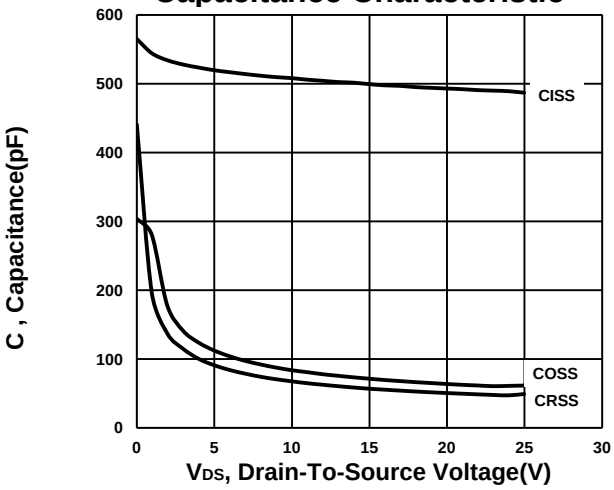
Transfer Characteristics



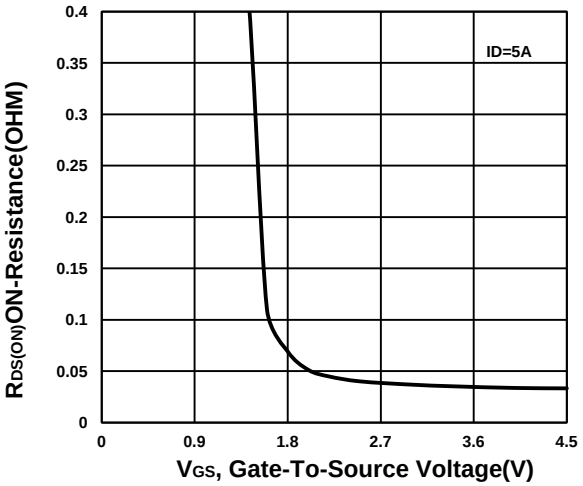
Gate charge Characteristics



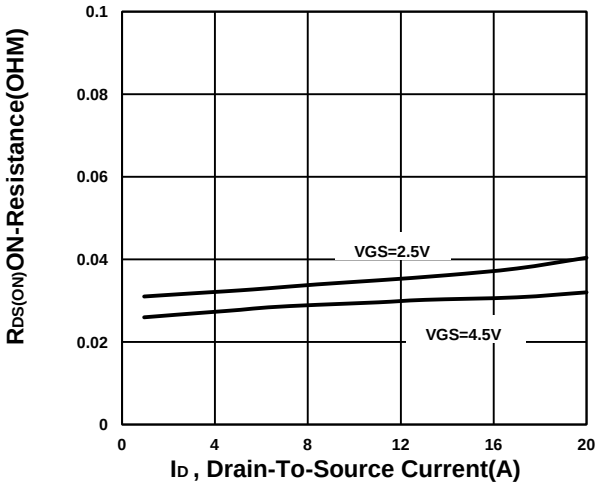
Capacitance Characteristic



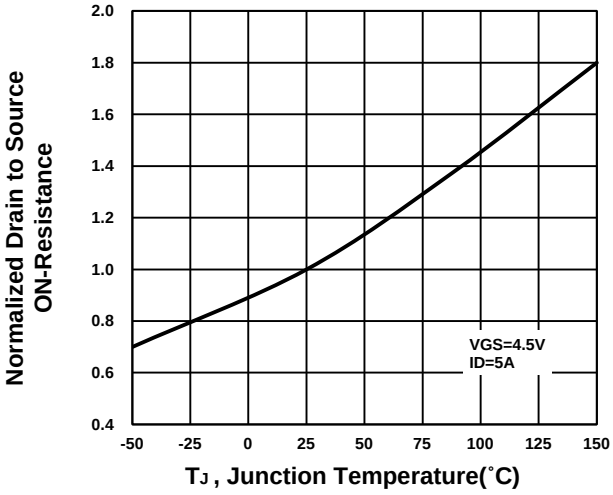
On-Resistance VS Gate-To-Source Voltage



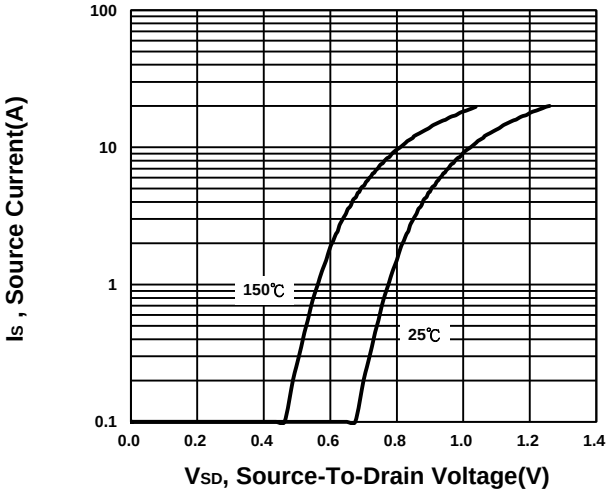
On-Resistance VS Drain-To-Source Current



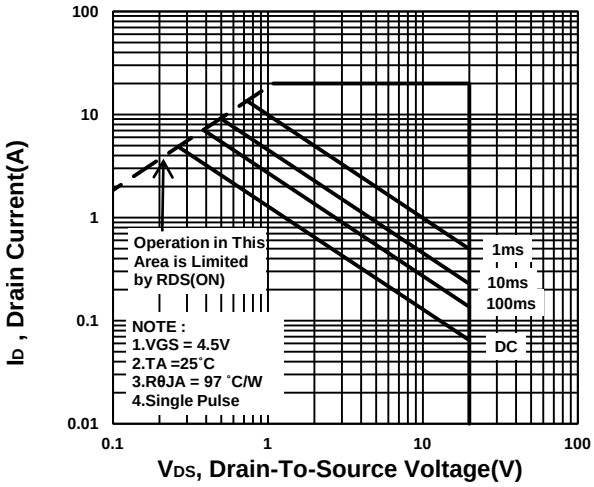
On-Resistance VS Temperature



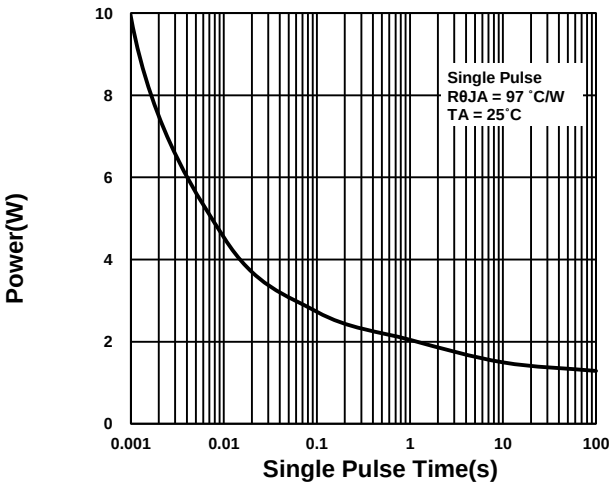
Source-Drain Diode Forward Voltage



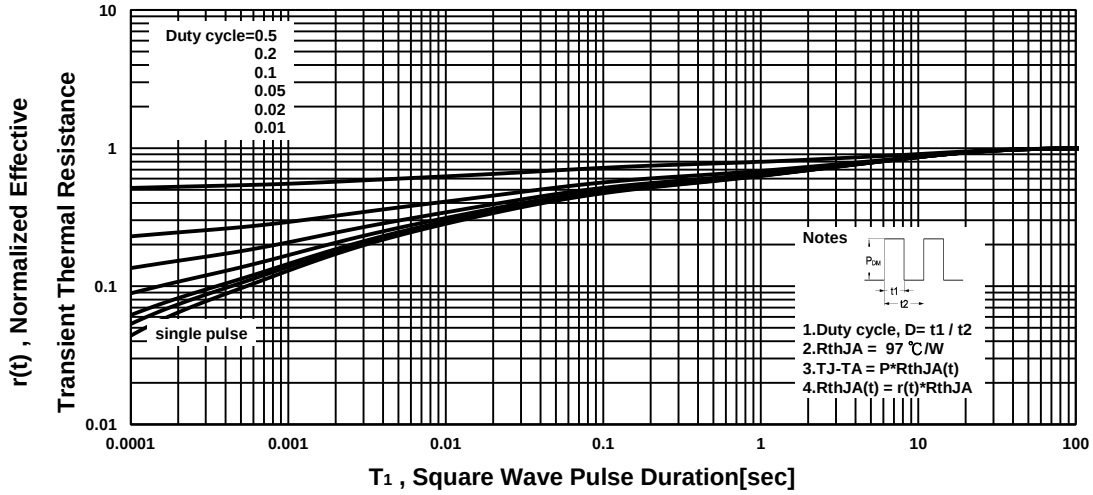
Safe Operating Area



Single Pulse Maximum Power Dissipation

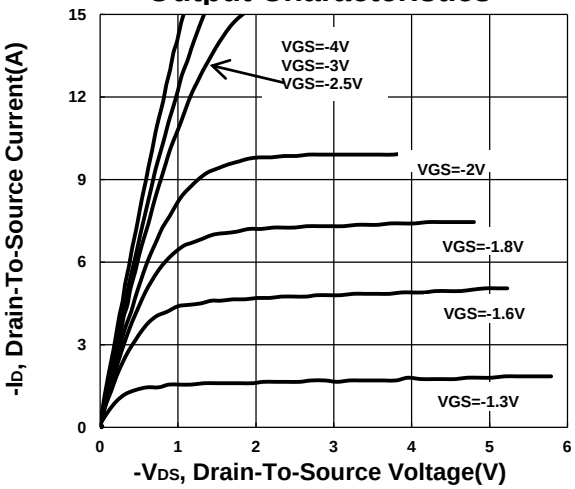


Transient Thermal Response Curve

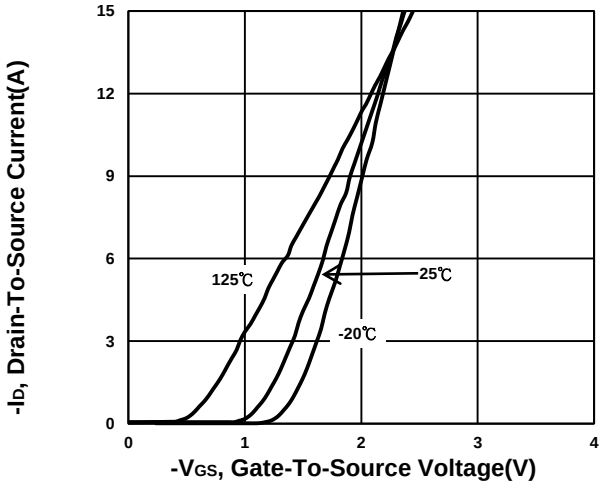


P-CHANNEL

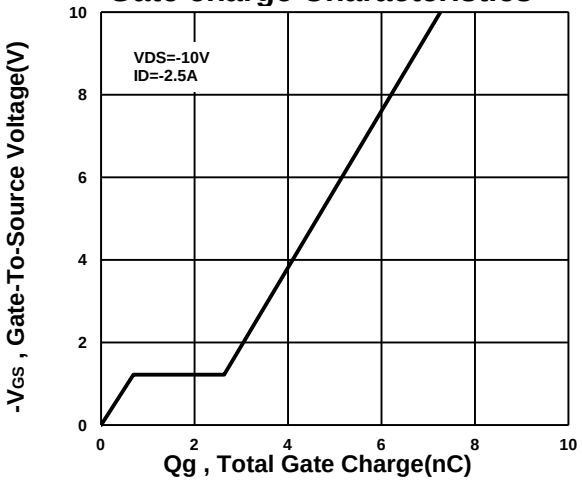
Output Characteristics



Transfer Characteristics



Gate charge Characteristics



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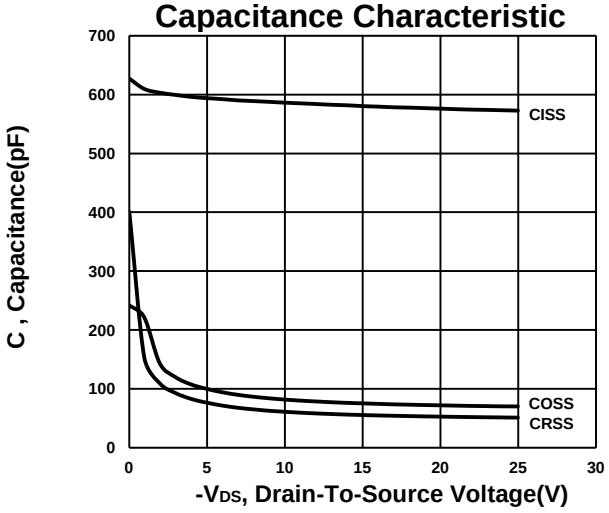
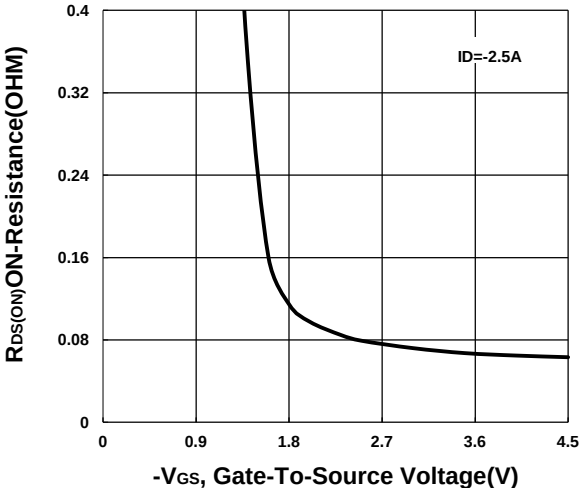
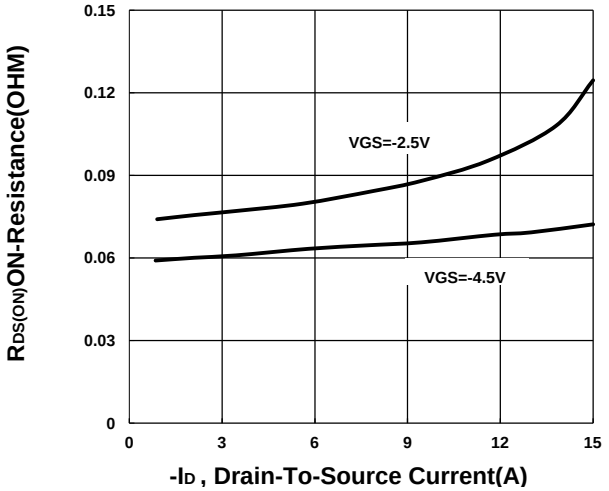


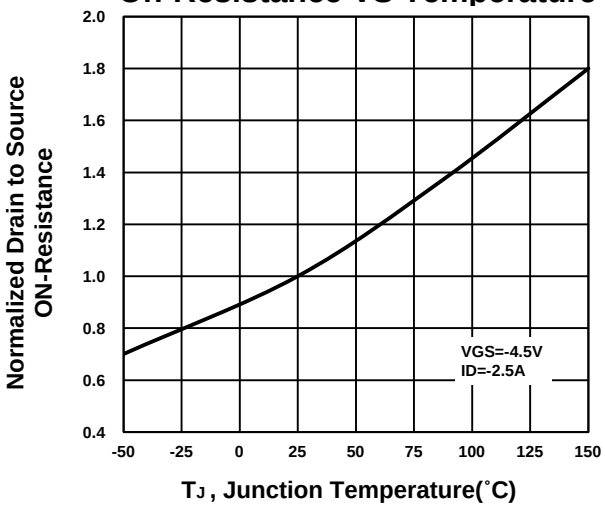
On-Resistance VS Gate-To-Source Voltage



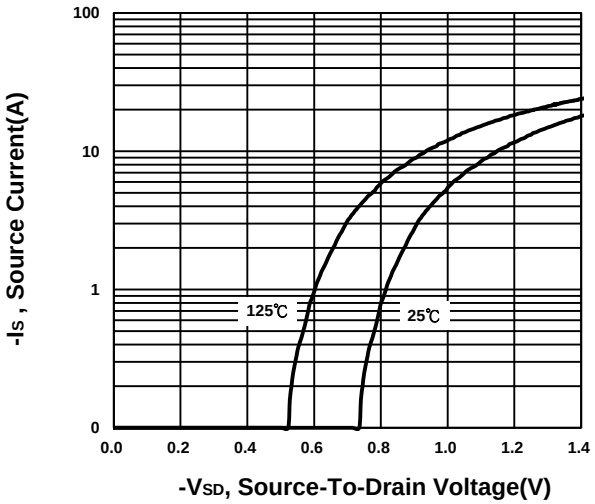
On-Resistance VS Drain-To-Source Current



On-Resistance VS Temperature



Source-Drain Diode Forward Voltage



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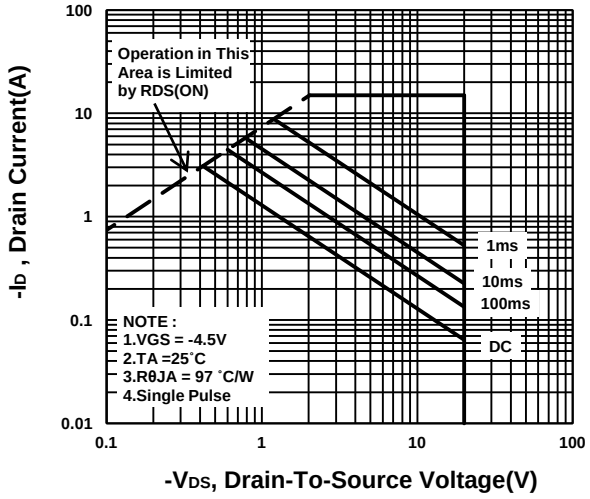

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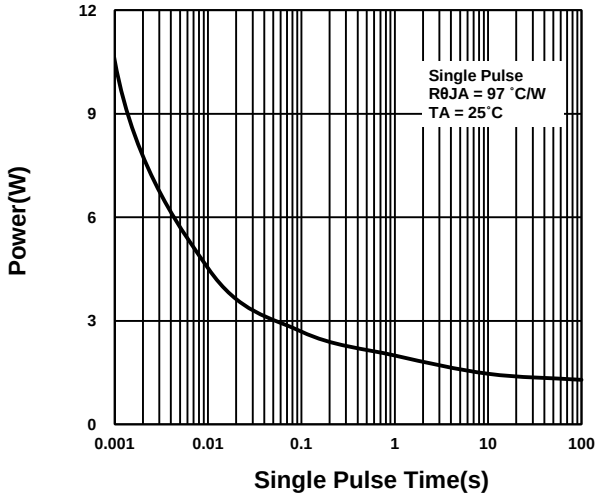

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