KTP(C)109-40X-12

1200V/40A/80mΩ Silicon Carbide Power MOSFET

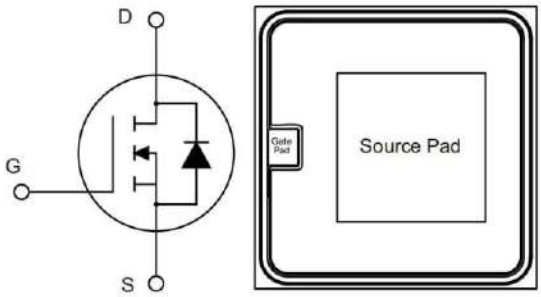
Features

- High Blocking Voltage with Low O-Resistance
- High Speed Switching with Low Capactiances
- Easy to parallel and simple to drive
- Avanche Ruggedness

Key Characteristics		
V_{DS}	1200	V
I_D, T_C = 25°C	40	A
$R_{DS(on)}$	80	mΩ

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power applications



Chip	Package	Packing
KTP(C)109-40X-12	die	Good dice in cavity plate

Maximum Ratings

Parameter	Symbol	Test Condition	Value	Unit
Drain - Source Voltage	V_{DSmax}	V_{GS} = 0 V, I_D = 100 μA	1200	V
Gate - Source Voltage	V_{GSmax}	Absolute maximum values	-10/+25	V
Gate - Source Voltage	V_{GSop}	Recommended operational values	-5/+20	V
Continuous Drain Current	I_D	V_{GS} = 20 V, T_C = 25°C	40	A
		V_{GS} = 20 V, T_C = 100°C	25.4	
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_p limited by T_{jmax}	160	A
Operating Junction and Storage Temperature	T_j, T_{stg}		-55 to +150	℃
Solder Temperature	T_L	1.6mm (0.063") from case for 10s	260	℃

Reverse Diode Characteristics

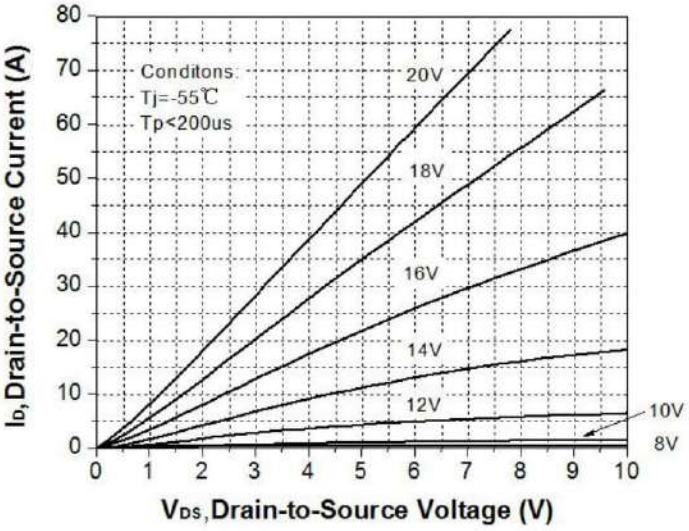
Parameter	Symbol	Test Conditions	Numerical			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_{SD} = 10 A, Tj=25℃	-	3.25		V
Continuous Diode Forward Current	I_S	T_C=25℃		40		A
Reverse Recovery Time	trr	V_{GS}=-5V I_{SD}=20A, di/dt=100A/us V_{DD}=800V, T_J=25℃	-	67		ns
Reverse Recovery Charge	Qrr		-	46		nC
Peak Reverse Recovery Current	Irrm			-1.2		A

Electrical Characteristics

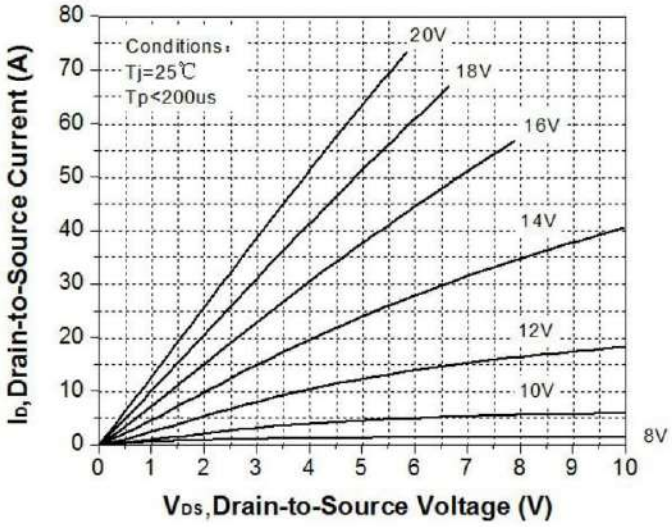
Parameter	Symbol	Test Conditions	Numerical			Unit
			Min.	Typ.	Max.	
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 μA	1200			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	3	4		
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200 V, V_{GS} = 0 V		1	100	μA
		V_{DS} = 1200 V, V_{GS} = 0 V, T_J=150℃		10		μA
Gate-Source Leakage Current	I_{GSS}	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} = 20 V, I_D = 20 A		80	100	mΩ
		V_{GS} = 20 V, I_D = 20 A, T_J=150℃		100		mΩ
Transconductance	g_{fs}	V_{DS}=20V, I_{DS}=20A		10.0		S
		V_{DS}=20V, I_{DS}=20A,T_J=150℃		10.3		
Input capacitance	C_{iss}	V_{GS} = 0 V , V_{DS}=1000V f=1MHZ , V_{AC}=25mV		1816		pF
Output capacitance	C_{oss}			142		
Reverse transfer capacitance	C_{rss}			24		
C_{OSS} Stroed Energy	E_{OSS}			71		uJ
Avalanche Energy, Single Pulse	E_{AS}	I_D=20A,V_{DD}=50V		1.08		J
Turn-on switching energy	E_{ON}	V_{DS}=800V, V_{GS}= -5/20 V I_D = 20A, $R_{G(ext)}$=6.8Ω L= 5.6mH		1.6		mJ
Turn-off switching energy	E_{OFF}			0.4		
Turn-on delay time	$T_{d(on)}$	V_{DD}=800V, V_{GS} = -5/20 V I_D = 20A, $R_{G(ext)}$=2.5Ω RL=40Ω		20		ns
Rise time	T_r			33		
Turn-off delay time	$T_{d(off)}$			21		
Fall Time	t_f			31		
Internal Gate Resistance	$R_{G(int)}$	F=1MHZ, V_{AC}=25mV		5.7		Ω
Gate to Source charge	Q_{gs}	V_{DS}=800V V_{GS} = 6/20 V I_D = 20A		26		nC
Gate to Drain charge	Q_{gd}			51		
Total gate charge	Q_g			102		

Performance Graphs

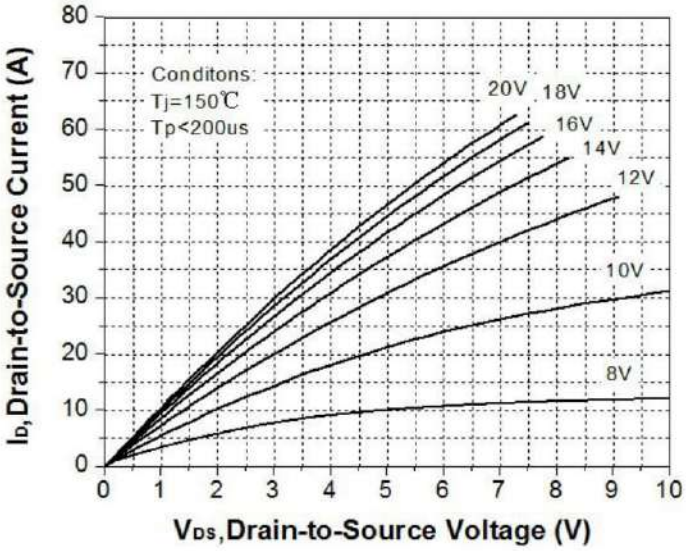
1) Output Characteristics T_J = -55 °C:



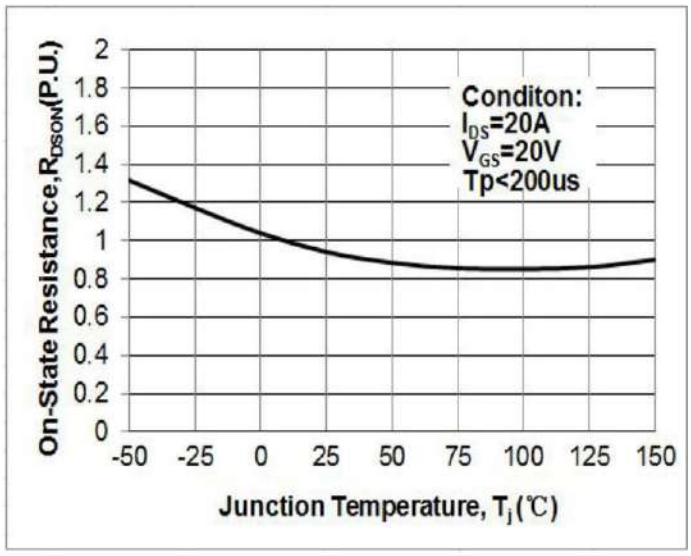
2) Output Characteristics T_J = 25 °C:



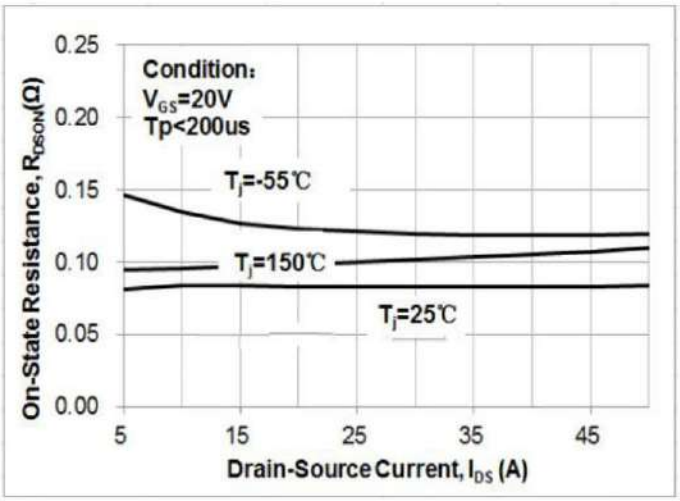
3) Output Characteristics T_J = 150 °C:



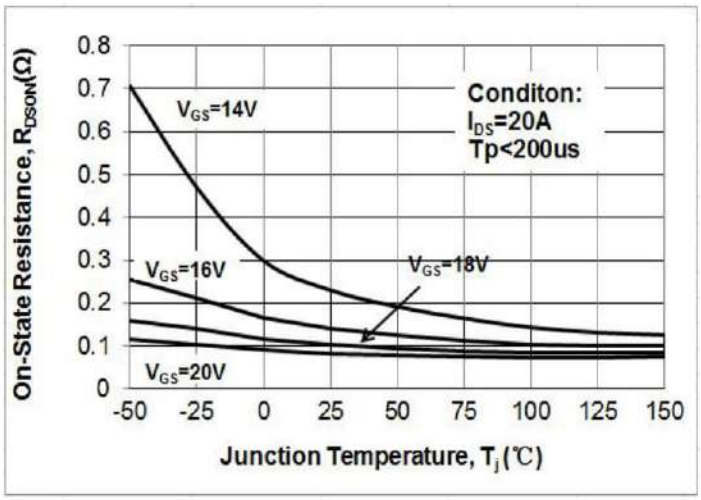
4) Normalized On-Resistance vs. Temperature



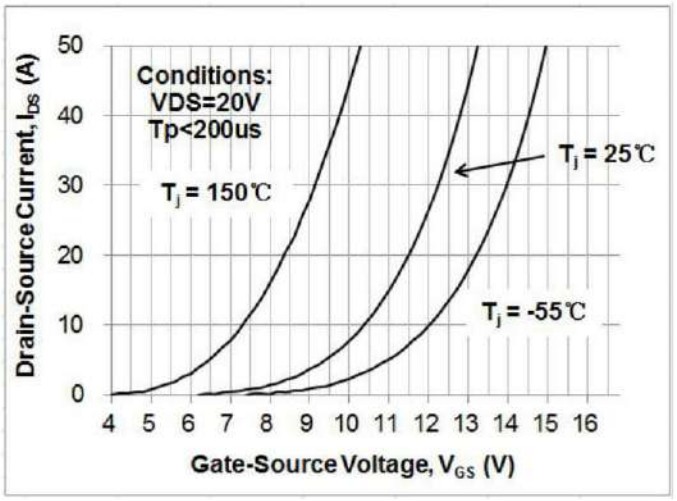
5) On-Resistance vs. Drain Current For Various Temperatures



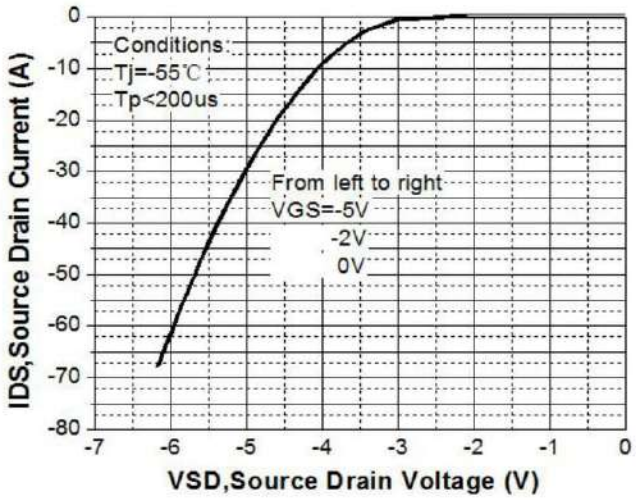
6) On-Resistance vs. Drain Current For Various Gate Voltage



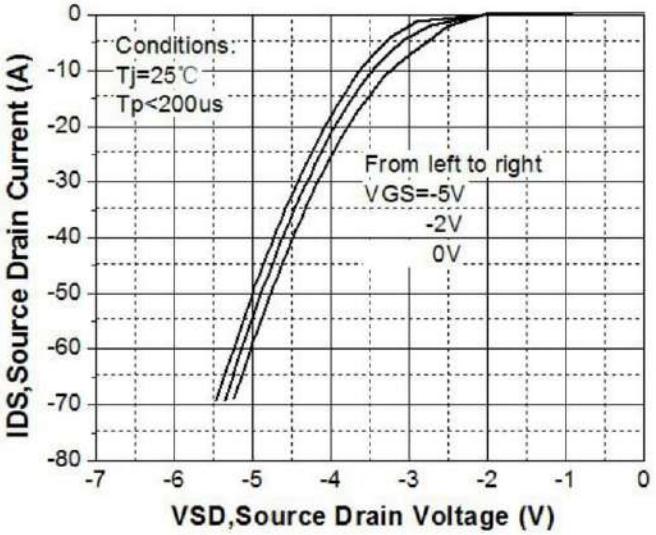
7） Transfer Characteristic for Various Junction Temperatures



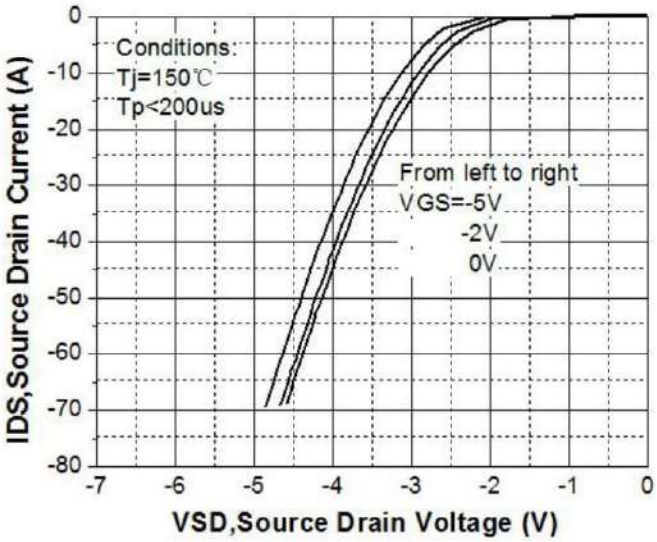
8) body Diode Characteristic at -55℃



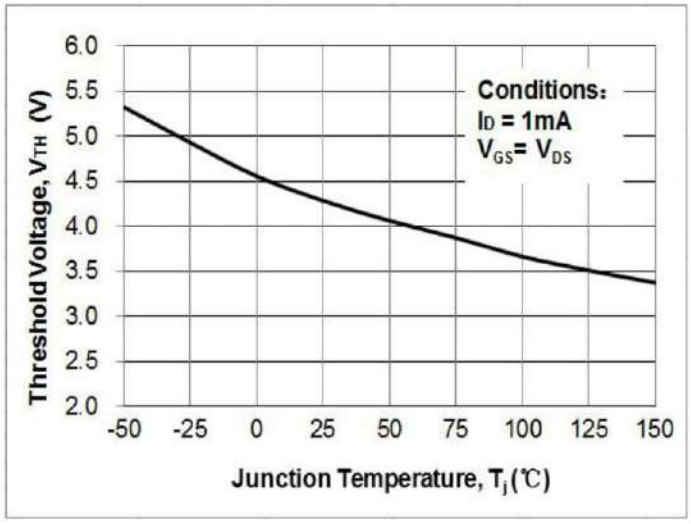
9) body Diode Characteristic at 25℃



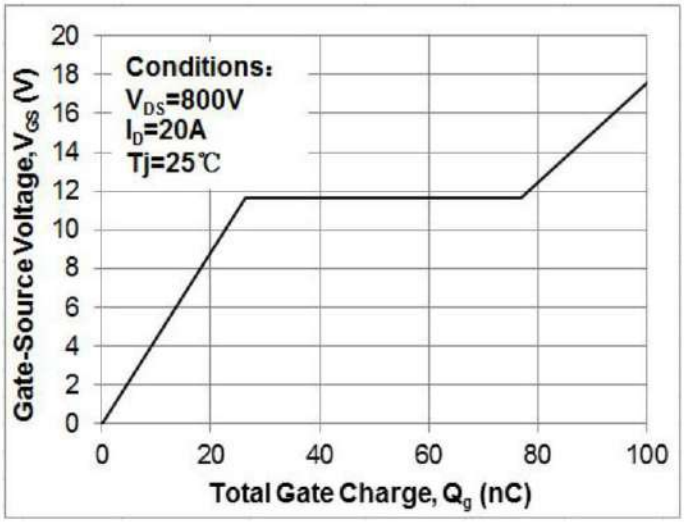
10) body Diode Characteristic at 150℃



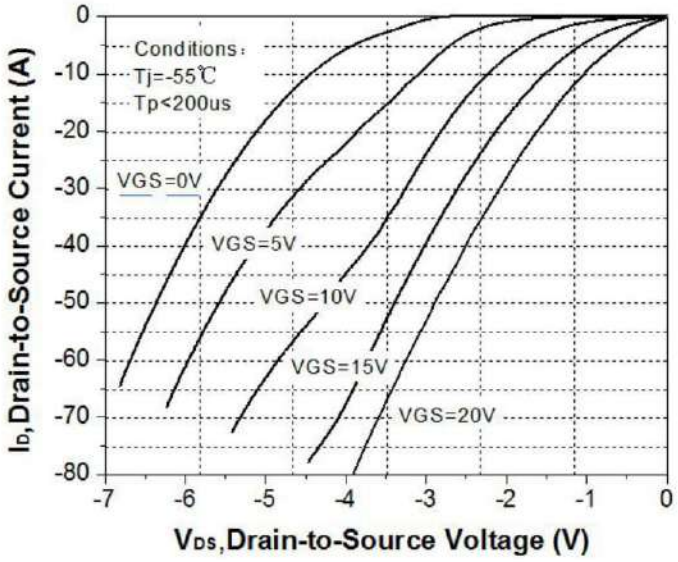
11) Threshold Voltage vs. Temperature



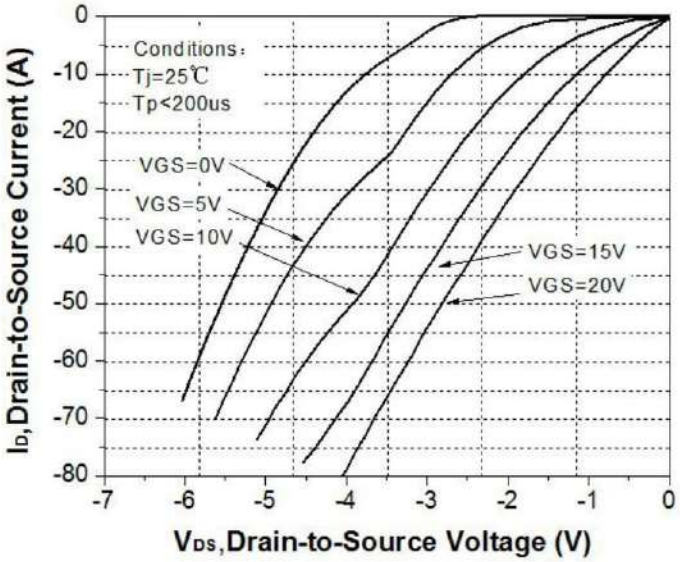
12) Gate Charge Characteristics



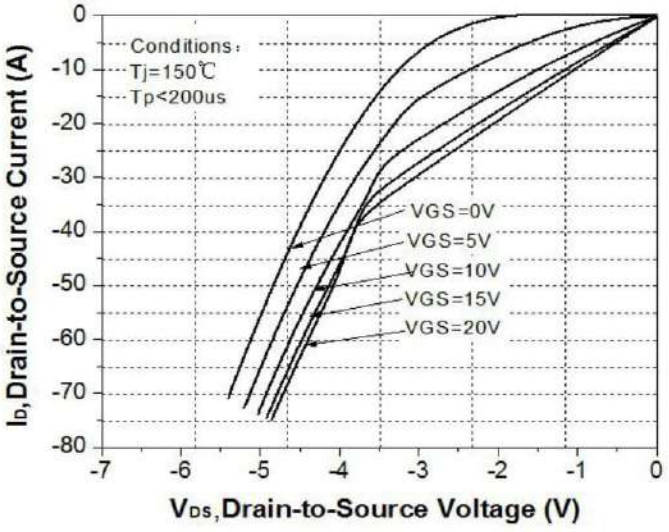
13) 3rd Quadrant Characteristic at -55℃



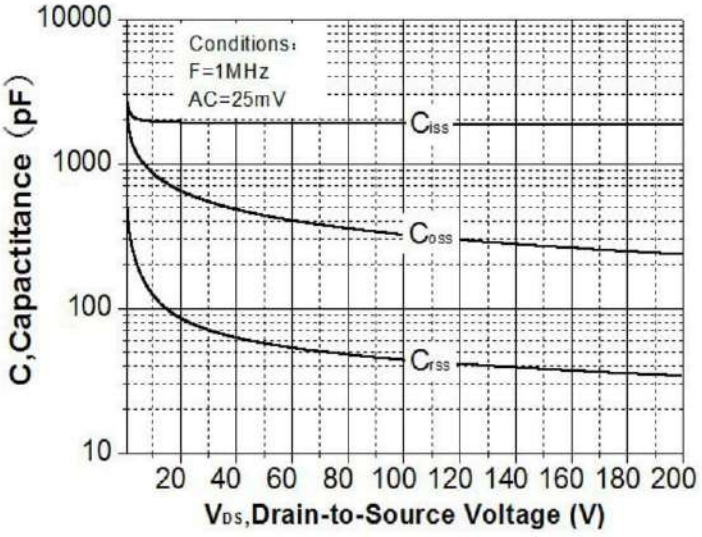
14) 3rd Quadrant Characteristic at 25℃



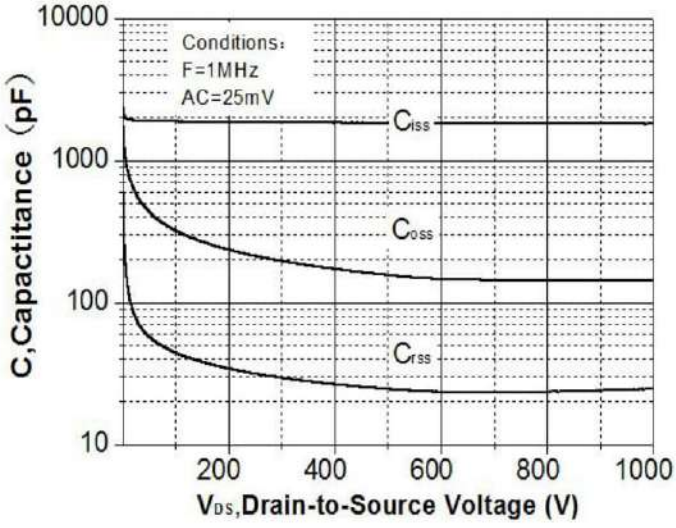
15) 3rd Quadrant Characteristic at 150℃



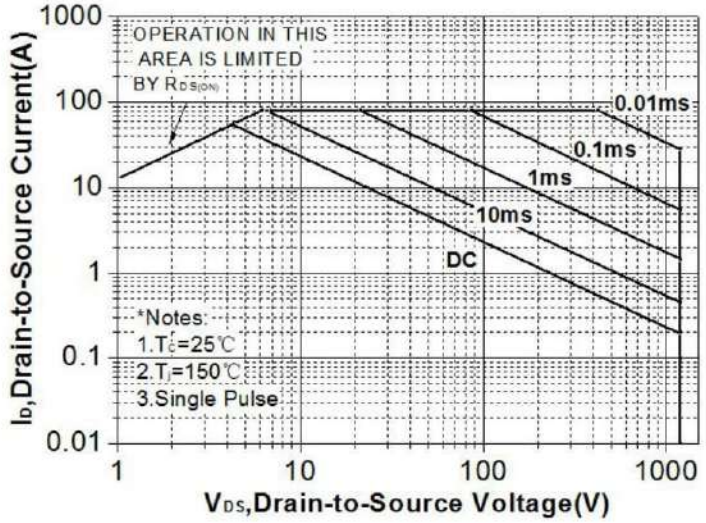
16) Capacitances vs. Drain-Source Voltage (0-200V)



17) Capacitances vs. Drain-Source Voltage (0-1000V)



18) Safe Operating Area



Mechanical parameters

Parameter	Value	Unit
Die size	3.8*3.8	mm
Die thickness	360 ± 25	μm
Top side metalization (source, gate) Al, Si, Cu	3.2	μm
Bottom side metalization Ti, Ni, Au	0.6	μm
Gate pad size (L x W)	0.486 x 0.4	mm
Source pad size (L x W)	2 x 2	mm

Chip layout and dimensions