REASUNOS

RSM120040Z

N-Channel SiC Power MOSFET

V_{DS}	=	1200 V
$R_{DS(on)}$	=	40 mΩ
I_D@25℃	=	60 A

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive

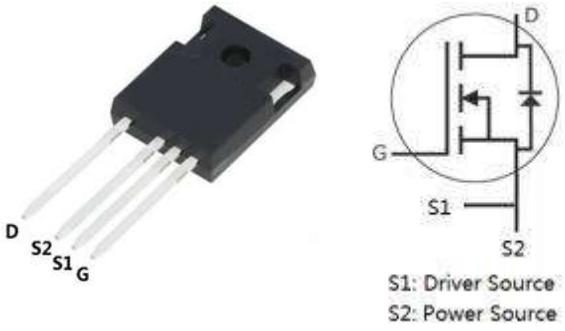
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Power Supplies
- High Voltage DC/DC Converters
- Motor Drives
- Switch Mode Power Supplies
- Pulsed Power applications

Package



Part Number	Package
RSM120040Z	TO-247-4

Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain-Source Voltage	1200	V	V_{GS}=0V, I_D=100μA	
V_{GSmax}	Gate-Source Voltage	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate-Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	60	A	V_{GS}=20V, T_c=25℃	
		40		V_{GS}=20V, T_c=100℃	
$I_{D(pulse)}$	Pulsed Drain Current	160	A	Pulse width t_p limited by T_{Jmax}	
P_D	Power Dissipation	330	W	T_c=25℃, T_J=150℃	
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to +150	℃		

Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1200	/	/	V	V_{GS}=0V, I_D=100μA	
$V_{GS(th)}$	Gate Threshold Voltage	1.9	2.5	4.0	V	V_{DS}=V_{GS}, I_D=10mA	Fig. 11
		/	1.8	/		V_{DS}=V_{GS}, I_D=10mA, T_J=150℃	
I_{DSS}	Zero Gate Voltage Drain Current	/	1	100	μA	V_{DS}=1200V, V_{GS}=0V	
I_{GSS+}	Gate-Source Leakage Current	/	10	250	nA	V_{DS}=0V, V_{GS}=25V	
I_{GSS-}	Gate-Source Leakage Current	/	10	250	nA	V_{DS}=0V, V_{GS}=-10V	
$R_{DS(on)}$	Drain-Source On-State Resistance	/	40	55	mΩ	V_{GS}=20V, I_D=40A	Fig. 4,5,6
		/	80	/		V_{GS}=20V, I_D=40A, T_J=150℃	
C_{iss}	Input Capacitance	/	2946	/	pF	V_{GS}=0V V_{DS}=1000V f=1MHz V_{AC}=25mV	Fig. 15,16
C_{oss}	Output Capacitance	/	167	/			
C_{rss}	Reverse Transfer Capacitance	/	6.6	/			
E_{oss}	C_{oss} Stored Energy	/	92	/	μJ		
E_{ON}	Turn-On Switching Energy	/	1.1	/	mJ	V_{DS}=800V, V_{GS}=-5V/20V I_D=40A, $R_{G(ext)}$=2.5Ω, L=100μH	
E_{OFF}	Turn-Off Switching Energy	/	0.85	/			
$t_{d(on)}$	Turn-On Delay Time	/	12	/	ns	V_{DS}=800V, V_{GS}=-5V/20V, I_D=40A $R_{G(ext)}$=2.5Ω, R_L=20Ω	
t_r	Rise Time	/	10	/			
$t_{d(off)}$	Turn-Off Delay Time	/	25	/			
t_f	Fall Time	/	6.2	/			
$R_{G(int)}$	Internal Gate Resistance	/	2.3	/	Ω	f=1MHz, V_{AC}=25mV	
Q_{GS}	Gate to Source Charge	/	37	/	nC	V_{DS}=800V V_{GS}=-5V/20V I_D=40A	
Q_{GD}	Gate to Drain Charge	/	18	/			
Q_G	Total Gate Charge	/	142	/			

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.5	/	V	V_{GS}=-5V, I_{SD}=20A	Fig. 8,9,10
		4.2	/		V_{GS}=-5V, I_{SD}=20A, T_J=150℃	
I_S	Continuous Diode Forward Current	/	62	A	T_C=25℃	
t_{rr}	Reverse Recover Time	41	/	ns	V_R=800V, I_{SD}=40A	
Q_{rr}	Reverse Recovery Charge	142	/	nC		
I_{rrm}	Peak Reverse Recovery Current	6	/	A		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$R_{θJC}$	Thermal Resistance from Junction to Case	0.34	/	℃/W		
$R_{θJA}$	Thermal Resistance from Junction to Ambient	/	40			

Typical Performance

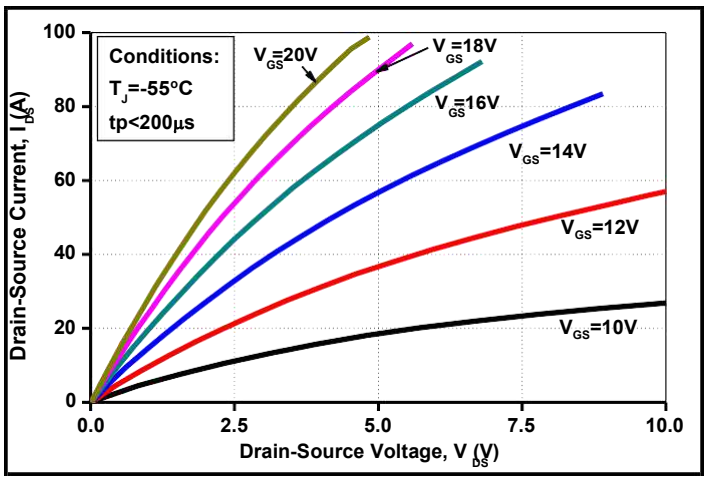


Figure 1. Output Characteristics T_J = -55 ℃

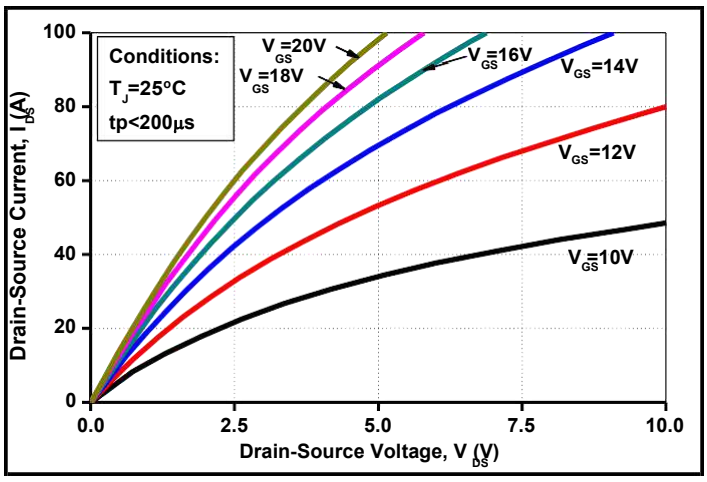


Figure 2. Output Characteristics T_J = 25 ℃

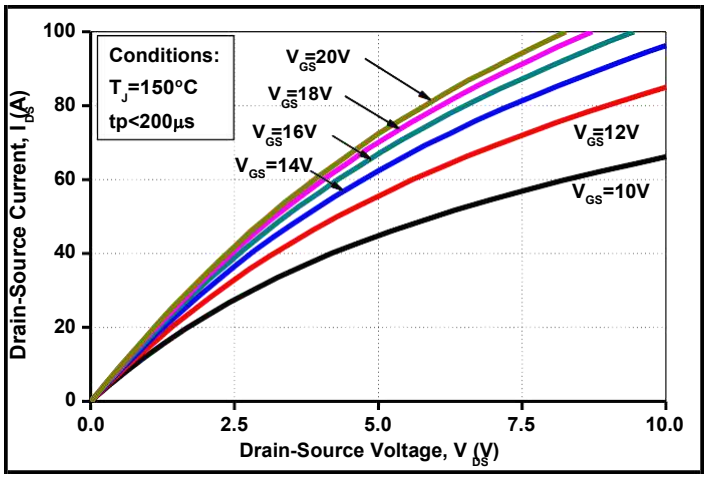


Figure 3. Output Characteristics T_J = 150 ℃

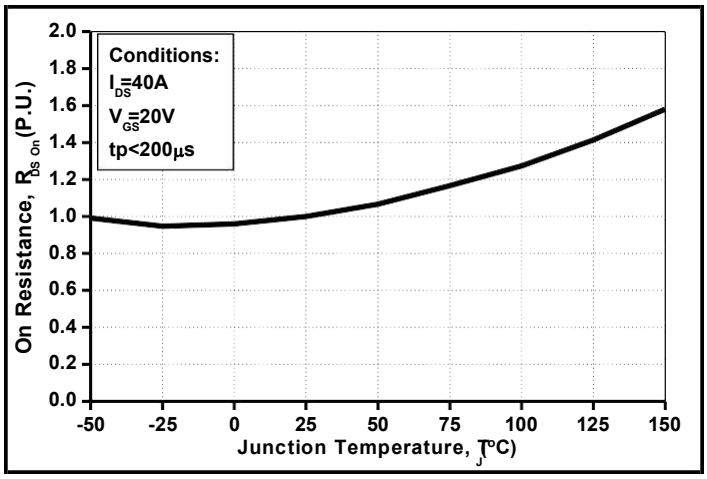


Figure 4. Normalized On-Resistance vs. Temperature

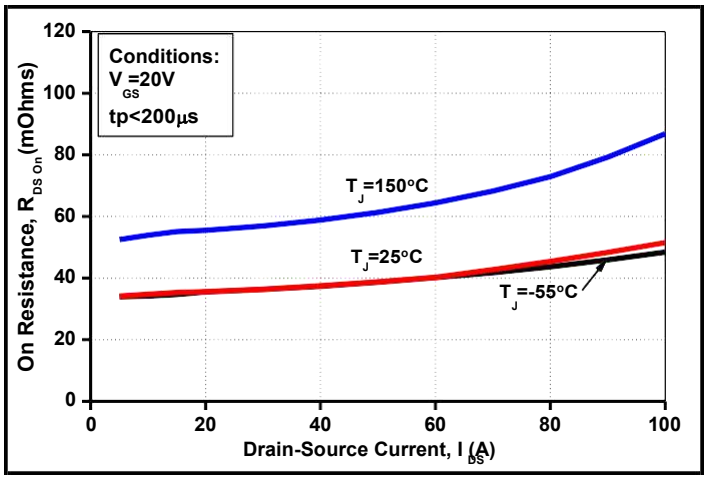


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

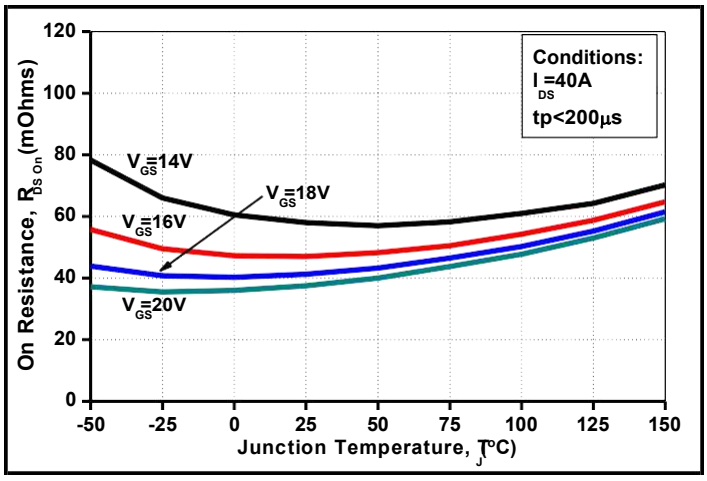


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Performance

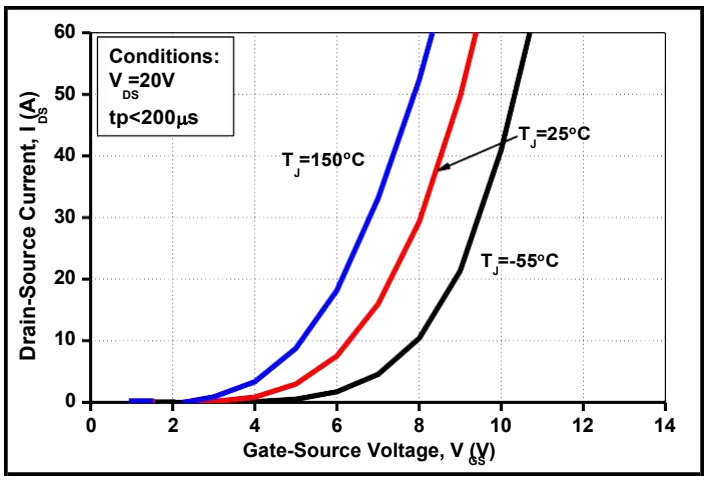


Figure 7. Transfer Characteristic for Various Junction Temperatures

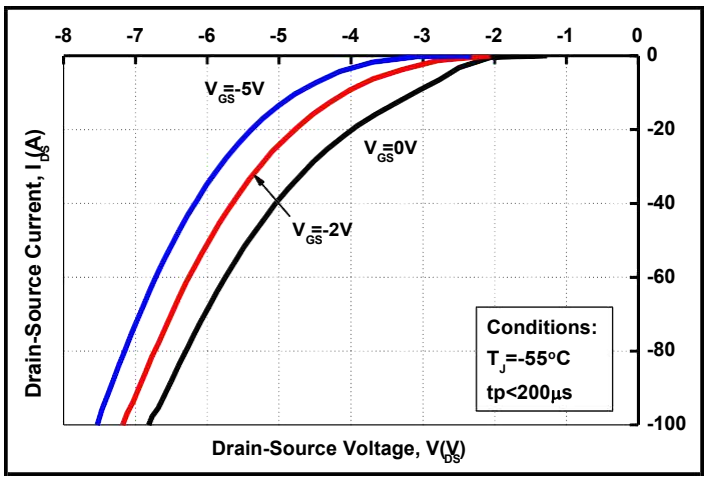


Figure 8. Body Diode Characteristic at -55 ℃

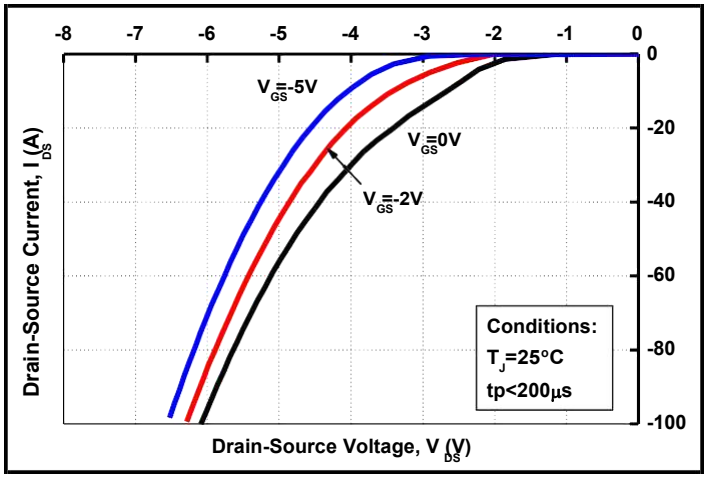


Figure 9. Body Diode Characteristic at 25 ℃

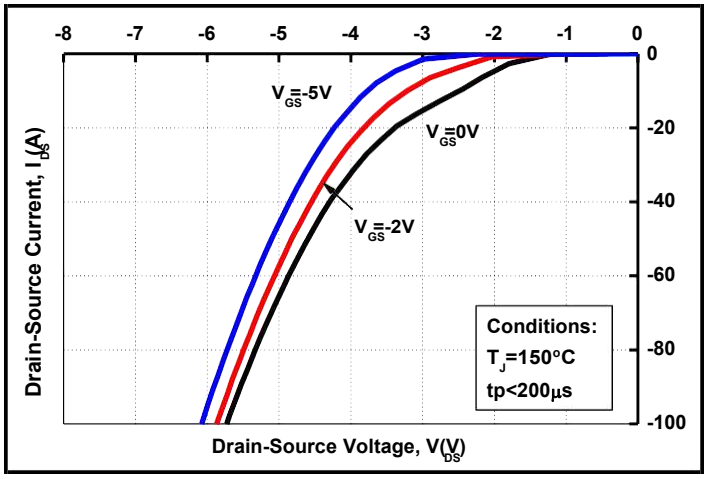


Figure 10. Body Diode Characteristic at 150 ℃

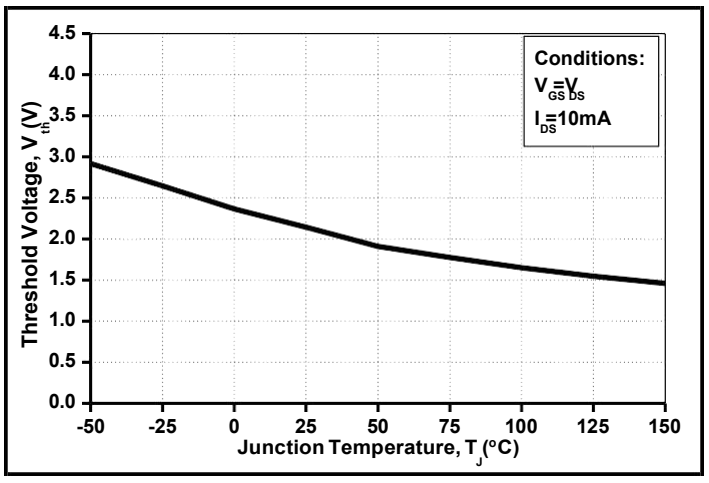


Figure 11. Threshold Voltage vs. Temperature

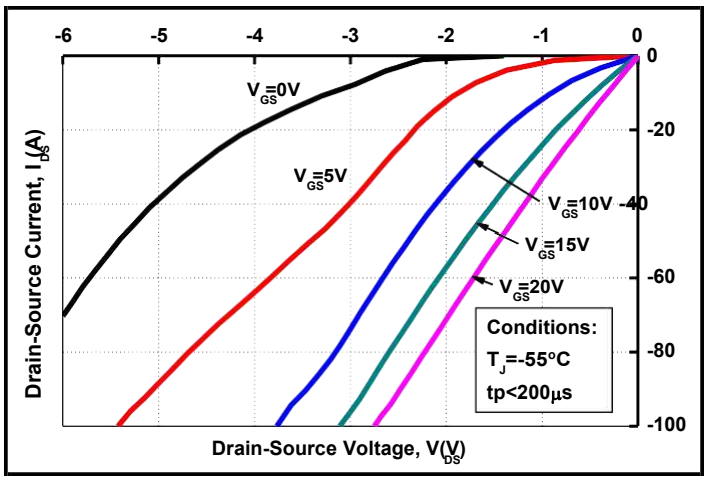


Figure 12. 3rd Quadrant Characteristic at -55 ℃

Typical Performance

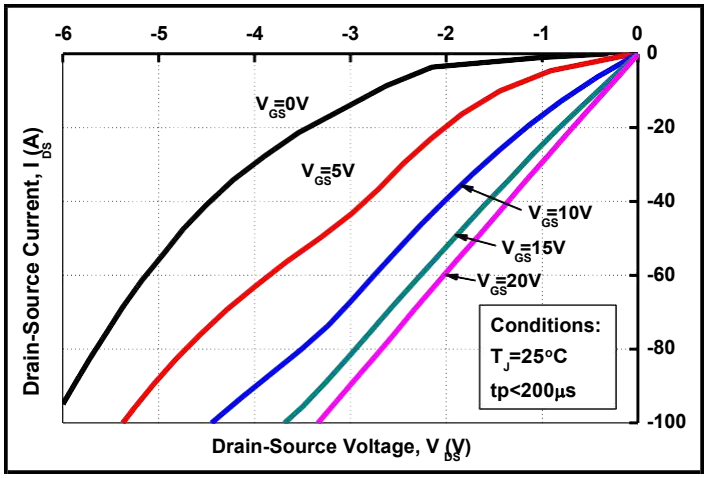


Figure 13. 3rd Quadrant Characteristic at 25 ℃

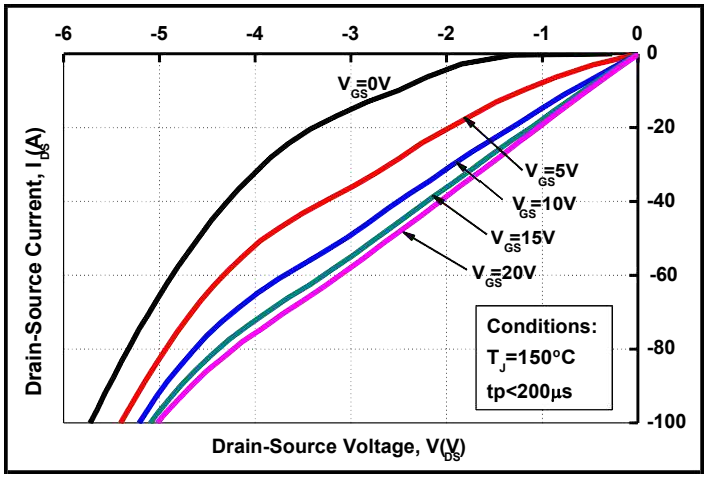


Figure 14. 3rd Quadrant Characteristic at 150 ℃

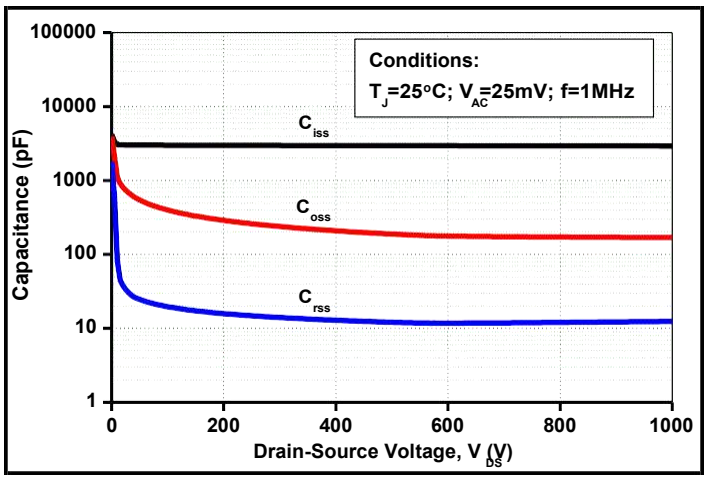


Figure 15. Capacitances vs. Drain-Source Voltage (0 - 200V)

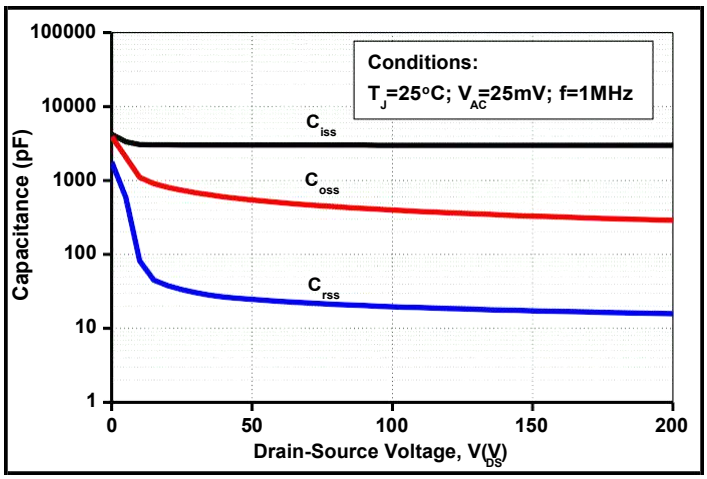
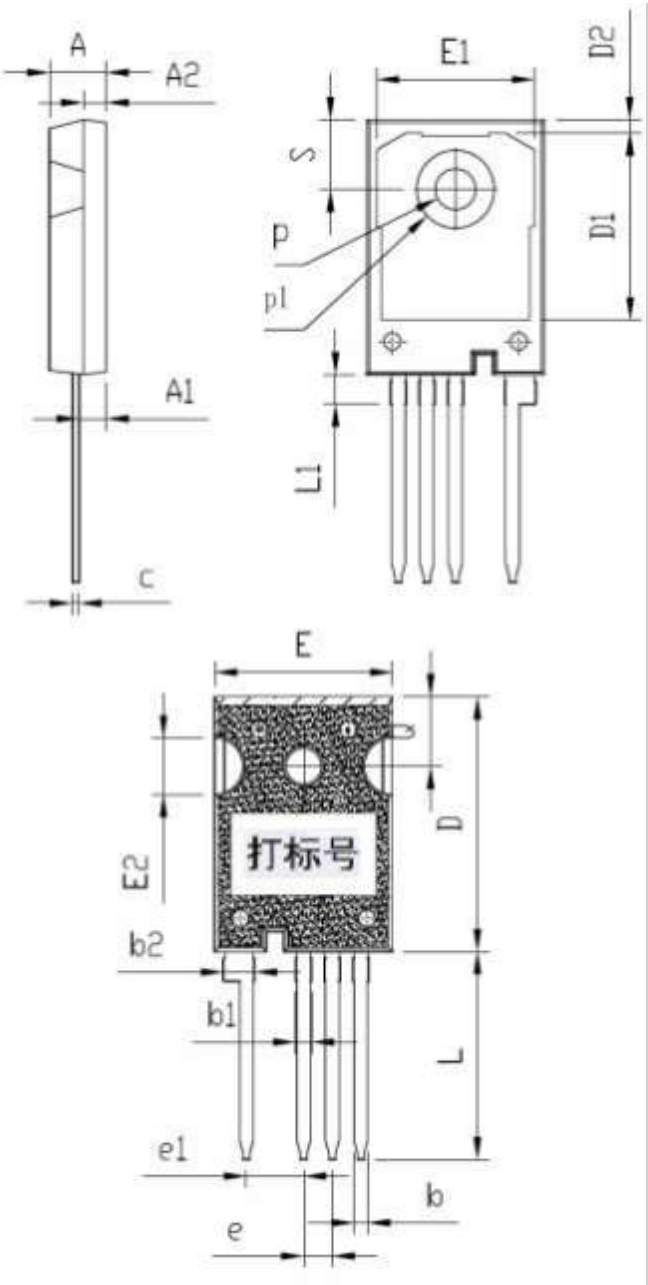


Figure 16. Capacitances vs. Drain-Source Voltage (0 - 1000V)

Package Dimensions

Package TO-247-4



SYMBOLS	DIMENSIONS IN MILLMETERS		
	MIN	NOM	MAX
A		5.00	
A1		2.40	
A2		2.00	
b		1.20	
b1		1.30	
b2		2.65	
c		0.6	
D		22.54	
D1		16.50	
D2		1.17	
e		2.54	
e1		5.08	
E		15.80	
E1		14.00	
E2		5.00	
L		18.38	
L1		2.58	
p		3.60	
p1		6.80	
Q		6.15	
S		6.15	

Disclaimers:

Reasunos Semiconductor Technology CO.,LTD(Reasunos)reserves the right to make changes without notice in order to improve reliability,function or design and to discontinue any product or service without notice .Customers should obtain the latest relevant information before orders and should verify that such information in current and complete.All products are sold subject to Reasunos's terms and conditions supplied at the time of orderacknowledgement.

Reasunos Semiconductor Technology CO.,LTD warrants performance of its hardware products to the speciffications at the time of sale.Testing,reliability and quality control are used to the extene Reasunos deems necessary to support this warrantee. Except where agreed upon by contr-actual agreement,testing of all parameters of each product is not necessarily performed.

Reasunos Semiconductor Technology CO.,LTD does not assume any liability arising from the use of any product or circuit designs described herein.Customers are responsible for their products and applications using Reasunos's components.To minimize risk,customers must provide adequate design and operating safeguards.

Reasunos Semiconductor Technology CO.,LTD does not warrant or convey any license eith-er expressed or implied under its patent rights,nor the rights of others.Reproduction of inform-ation in Reasunos's data sheeets or data books is permissible only if reproduction is without modification oralteration.Reproduction of this information with any alteration is an unfair and deceptive business practice. Reasunos Semiconductor Technology CO.,LTD is not responsi-ble or liable for such altered documentation.

Resale of Reasunos's products with statements different from or beyond the parameters stated by Reasunos Semiconductor Technology CO.,LTD for that product or service voids all exp-ress or implied warrantees for the associated Reasunos's product or service and is unfair and deceptive business practice. Reasunos Semiconductor Technology CO.,LTD is not responsi-ble or liable for such statements.

Life Support Policy:

Reasunos Semiconductor Technology CO.,LTD's Products are not authorized for use as cri-tical components in life support devices or systems without the expressed written approval of Reasunos Semiconductor Technology CO.,LTD.

As used herein:

1. Life support devices or systems are devices or systems which:
   a.are intended for surgical implant into the human body,
   b.support or sustain life,
   c.whose failuer to when properly used in accordance with instructions for used provided in the laeling,can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to system whose failure to perform can be reasonably expected to cause the failure of the life support device or system,or to affect its safety or effectiveness.