MX160065F

SiC N-MOSFET 650V,160mΩ,20A

Features

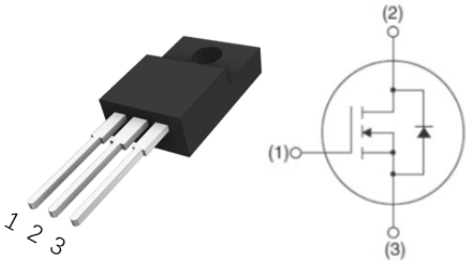
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes

Product Summary

V_{DS}	650V
$R_{DS(on)\_typ}$	160mΩ
I_D	20A

Applications

- Solar Inverters
- Switch Mode Power Supplies
- UPS
- Batterry Chargers



RoHS

Halogen Free

Package Marking and Ordering Information

Part #	Marking	Package
MX160065F	MX160065F	TO220F

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Continuous drain current T_C = 25°C T_C = 125°C	I_D	 20 11.5	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	67	A
Gate-Source voltage	V_{GS}	-4/+18	V
Gate-Source voltage（Absolute maximum values）	V_{GSmax}	-8/+22	V
Power dissipation (T_C = 25°C)	P_{tot}	65	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+175	°C

•Example of acceptable V_{GS} waveform

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	2.3	°C/W

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	V_{DSS}	650	-	-	V	V_{GS}=0V, I_D=100uA
Gate threshold voltage	$V_{GS(th)}$	2	2.8	4	V	V_{DS}=V_{GS},I_D=1mA
Zero gate voltage drain current	I_{DSS}	- -	1 5	10 -	μA	V_{DS}=650V,V_{GS}=0V T_C=25°C T_C=175°C
Gate-source leakage current	I_{GSS}	-		100	nA	V_{GS}=18V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	160 190	205	mΩ	V_{GS}=18V, I_D=7A, T_J=25°C T_J=175°C
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	484	-	pF	V_{DS} = 400V V_{GS} = 0V T_J = 25°C V_{AC} = 25mV f = 1MHz
Output Capacitance	C_{oss}	-	46.6	-		
Reverse Transfer Capacitance	C_{rss}	-	5.6	-		
Gate Total Charge	Q_G	-	18.2	-	nC	V_{DS} = 400V V_{GS} = -4/18V I_D = 7A
Gate-Source charge	Q_{gs}	-	6.6	-		
Gate-Drain charge	Q_{gd}	-	3.6	-		
Turn-On Switching Energy	E_{ON}	-	62.5	-	μJ	V_{DD} = 400V V_{GS} = -4/+18V I_D = 7A R_G = 5Ω
Turn-Off Switching Energy	E_{OFF}	-	9.53	-		
Turn-on delay time	$t_{d(on)}$	-	38.7	-	ns	
Rise time	t_r	-	13.5	-		
Turn-off delay time	$t_{d(off)}$	-	49.2	-		
Fall time	t_f	-	14.5	-		
Gate resistance	R_G	-	3.7	-	Ω	V_{AC} = 25mV, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		3		V	V_{GS}= 0V,I_{SD}=3.5A, T_J=25°C
			2.7			V_{GS}= 0V,I_{SD}=3.5A, T_J=175°C
Body Diode Reverse Recovery Time	t_{rr}	-	62	-	ns	V_R = 400V, V_{GS} = 0V I_D = 7A di/dt = 800A/μS T_J = 175°C
Body Diode Reverse Recovery Charge	Q_{rr}	-	31.8	-	nC	

Typical Performance Characteristics

Fig 1. Output Characteristic (T_J=-55℃)

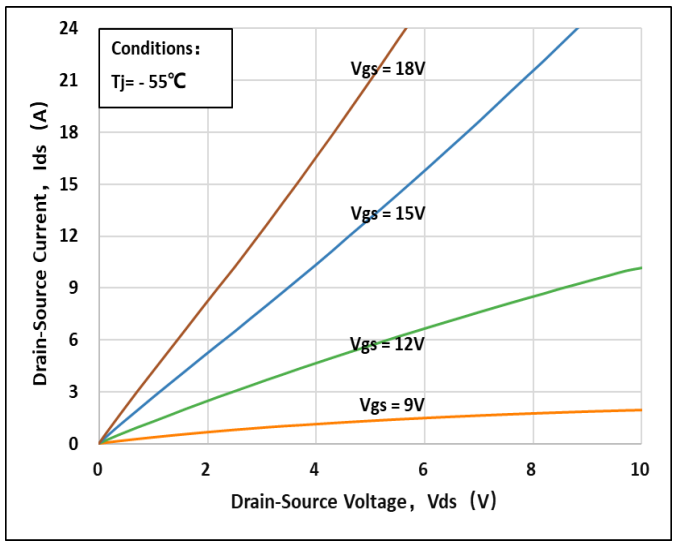


Fig 2. Output Characteristic (T_J=25℃)

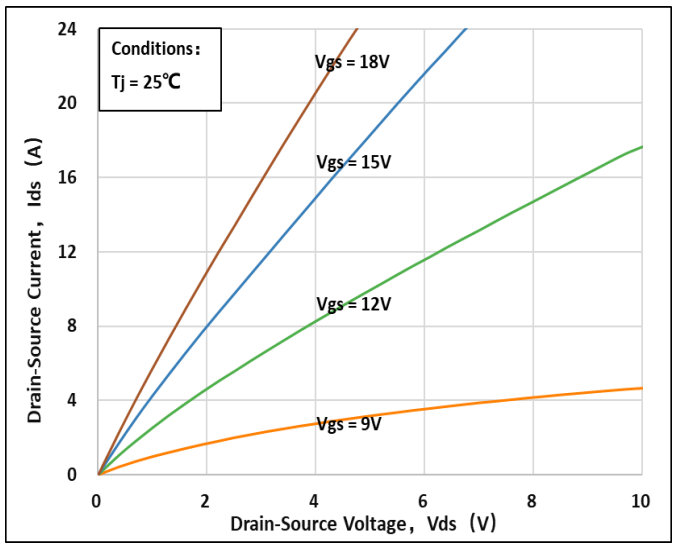


Fig 3. Output Characteristic (T_J=175℃)

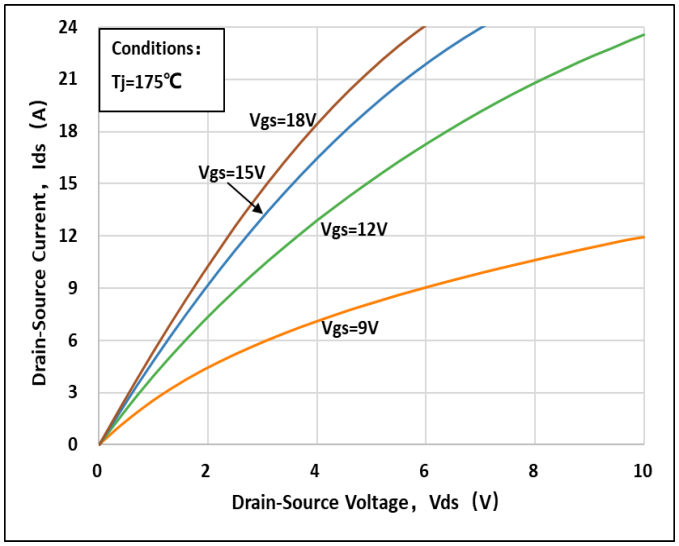


Fig 4: Rdson Vs Ids Characteristic

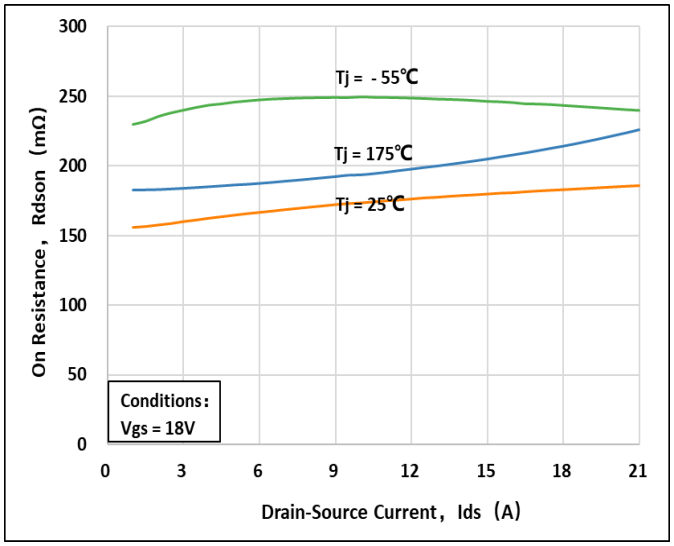


Fig 5: Rds(on) vs. Temperature

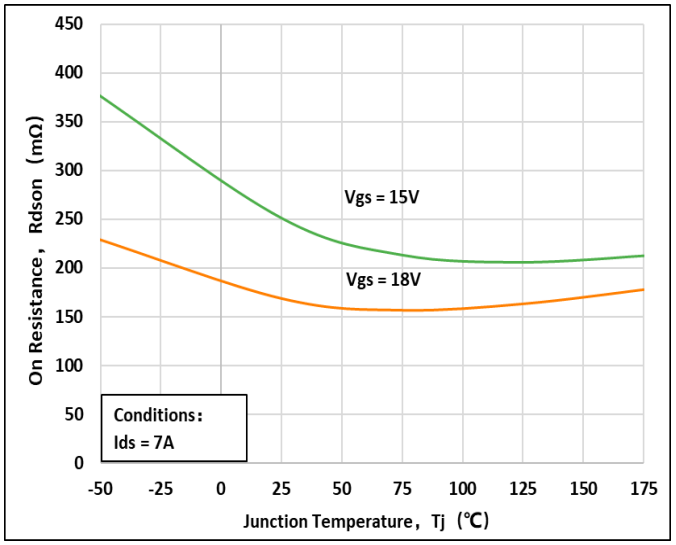


Fig 6: Transfer Characteristic

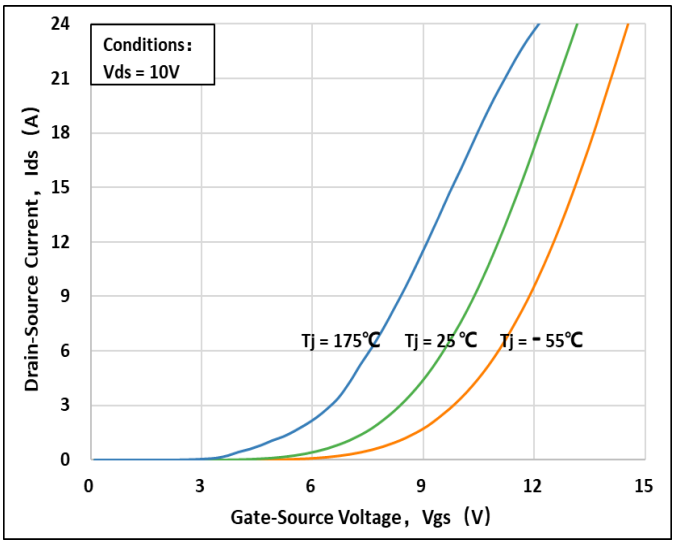


Fig 7: Body-diode Characteristic (T_J=-55℃)

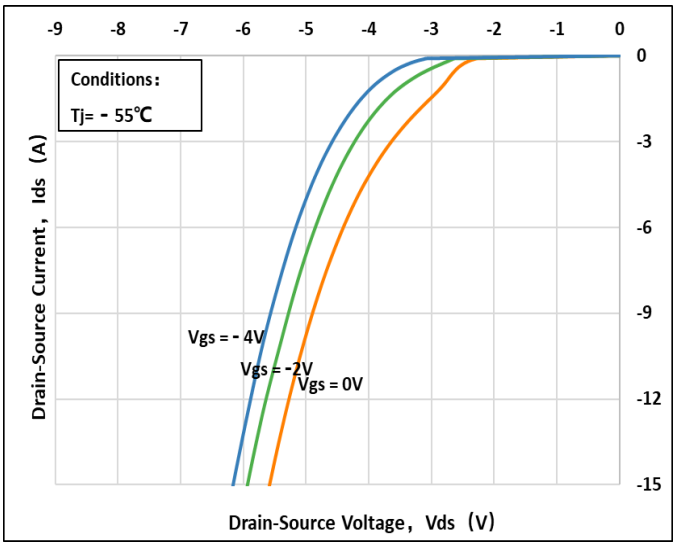


Fig 8: Body-diode Characteristic (T_J=25℃)

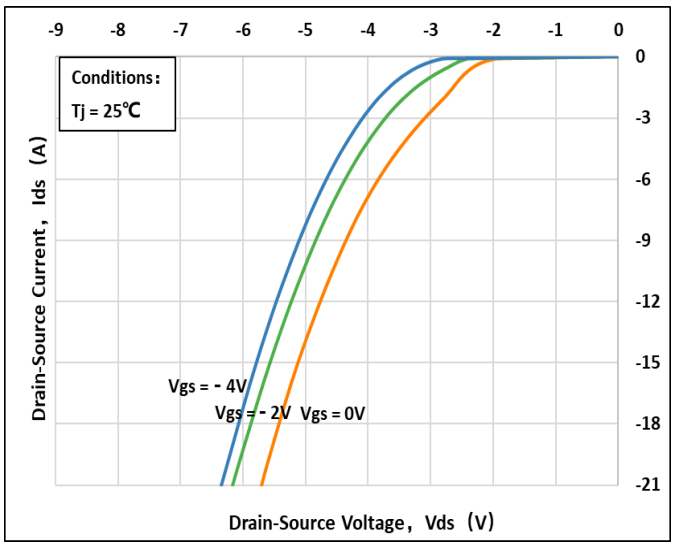


Fig 9: Body-diode Characteristic (T_J=175℃)

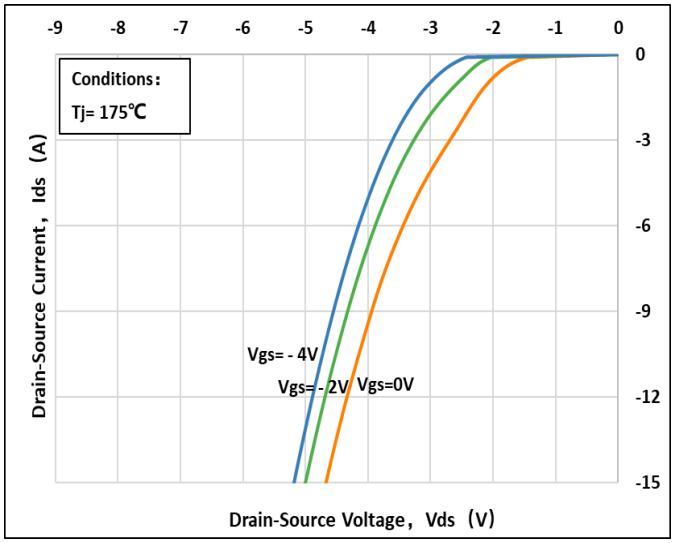


Fig 10: V_{TH} Vs T_J Temperature Characteristic

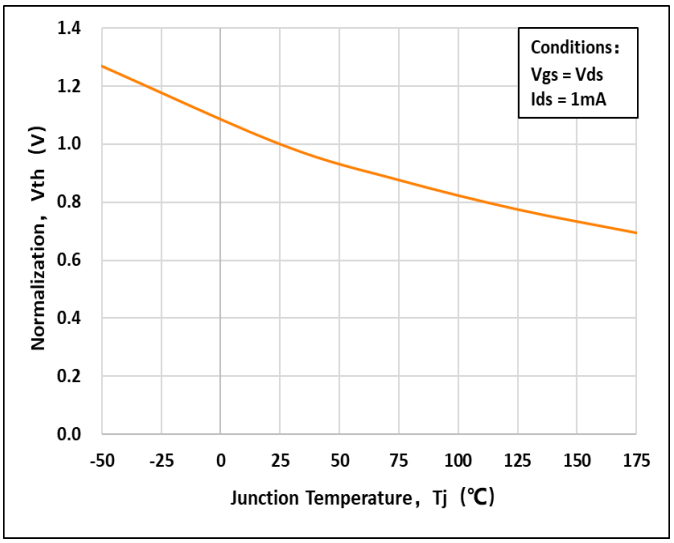


Fig 11: 3rd Quadrant Characteristic(T_J=-55℃)

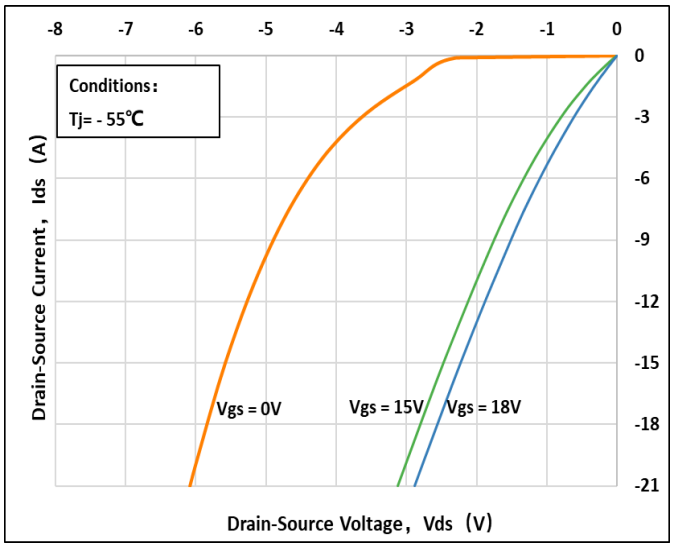


Fig 12: 3rd Quadrant Characteristic(T_J=25℃)

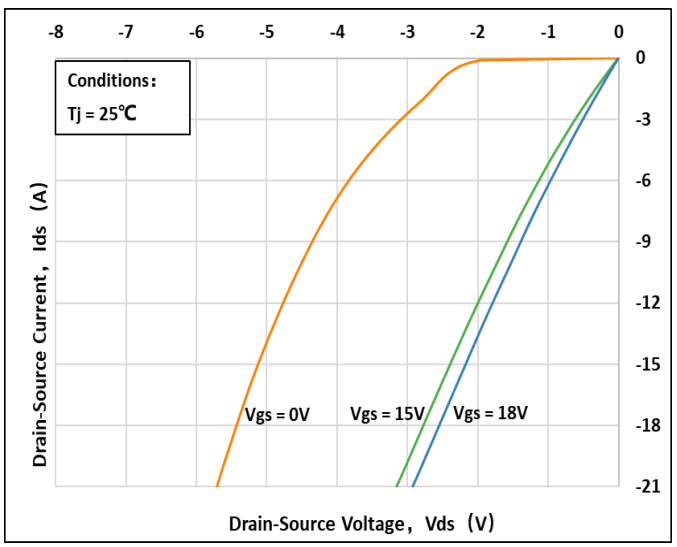


Fig 13: 3rd Quadrant Characteristic(T_J=175°C)

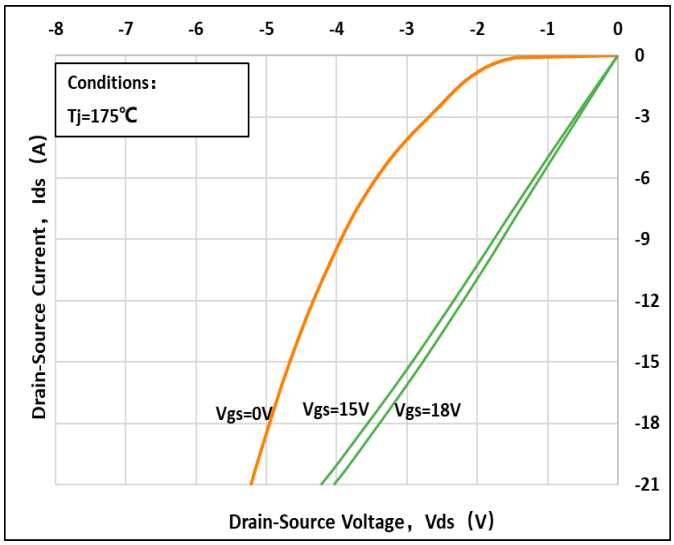


Fig 14: Gate Charge Characteristics

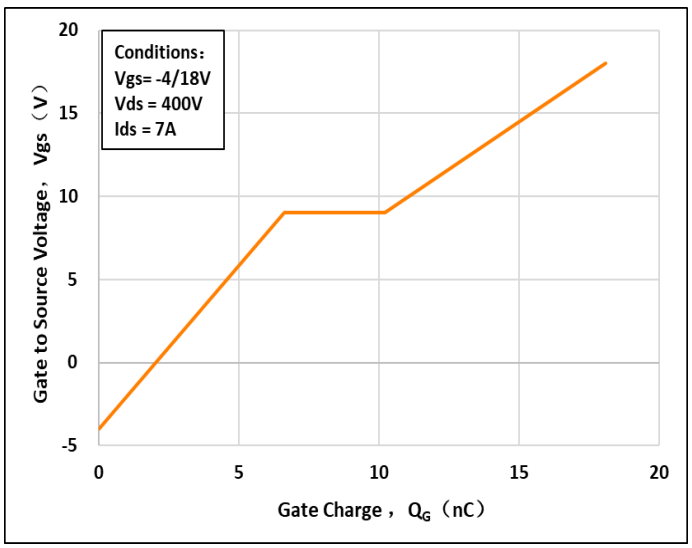


Fig 15:Continuous Drain Current vs.Case Temperature

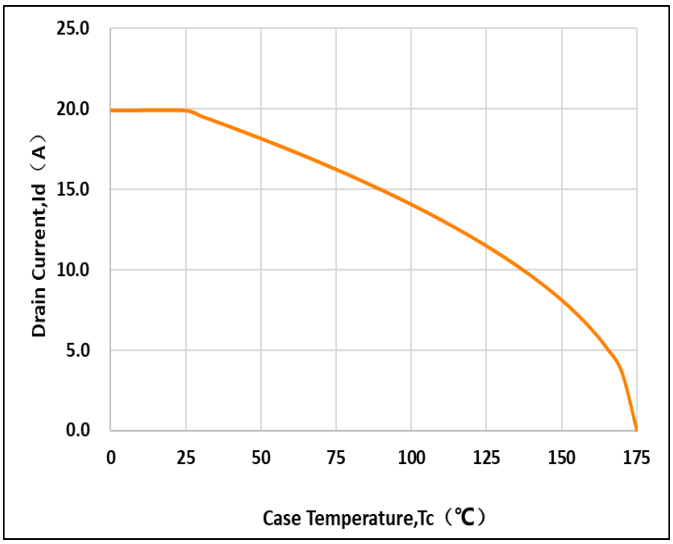


Fig 16: Safe Operating Area

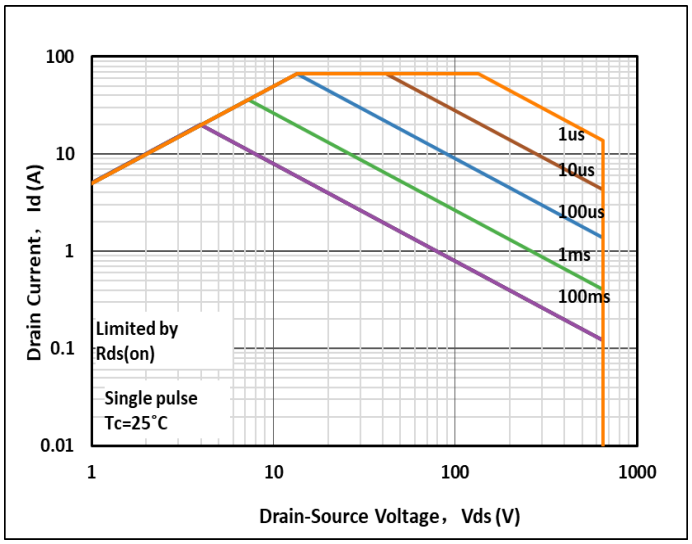


Fig 17: Capacitance Characteristics

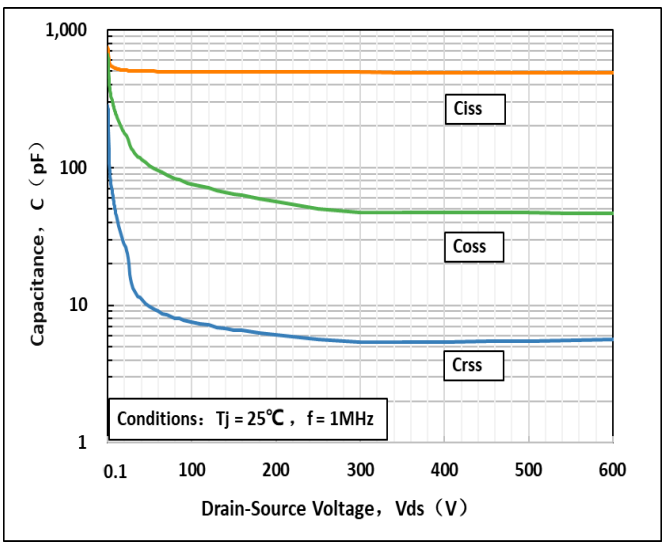
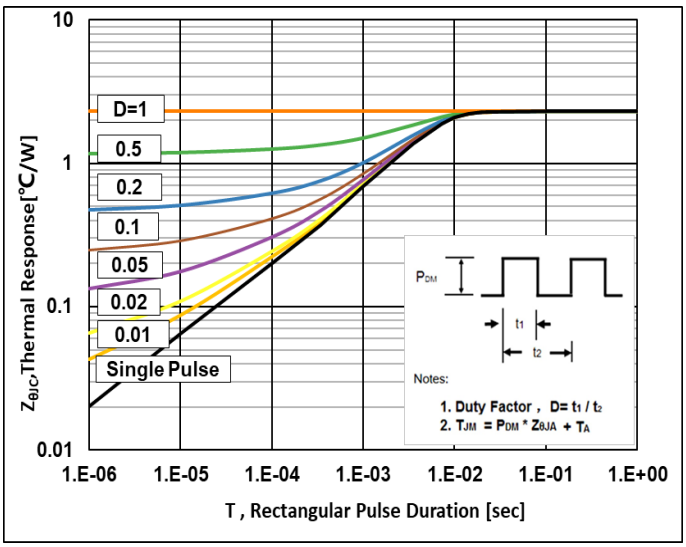
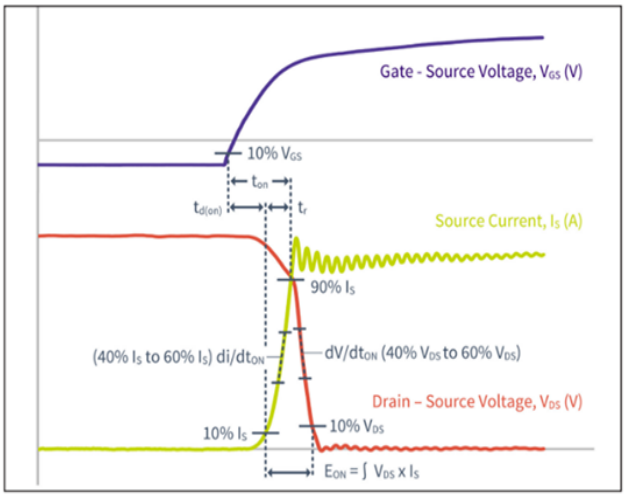


Fig 18: Transient Thermal Impedance

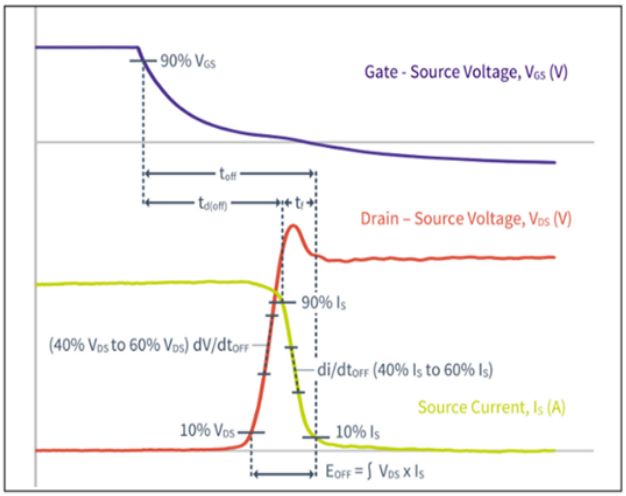


Test Circuit & Waveform

Figure A. Definition of switching times



Turn-on Transient Definitions



Turn-off Transient Definitions

Figure B. Dynamic test circuit

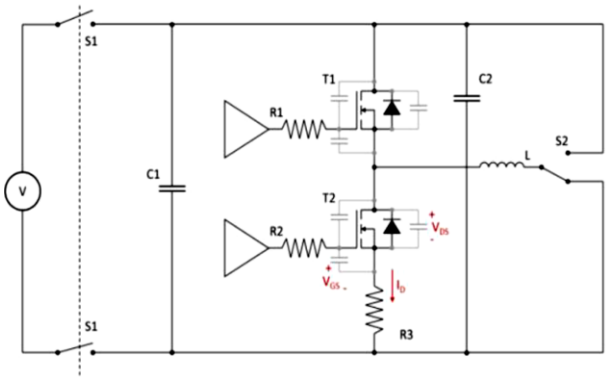
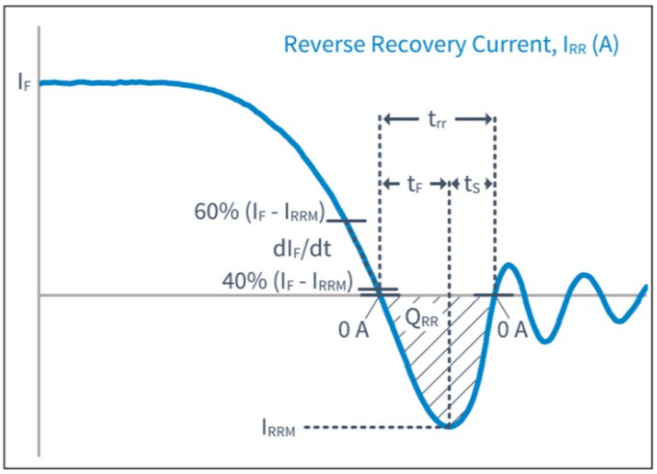
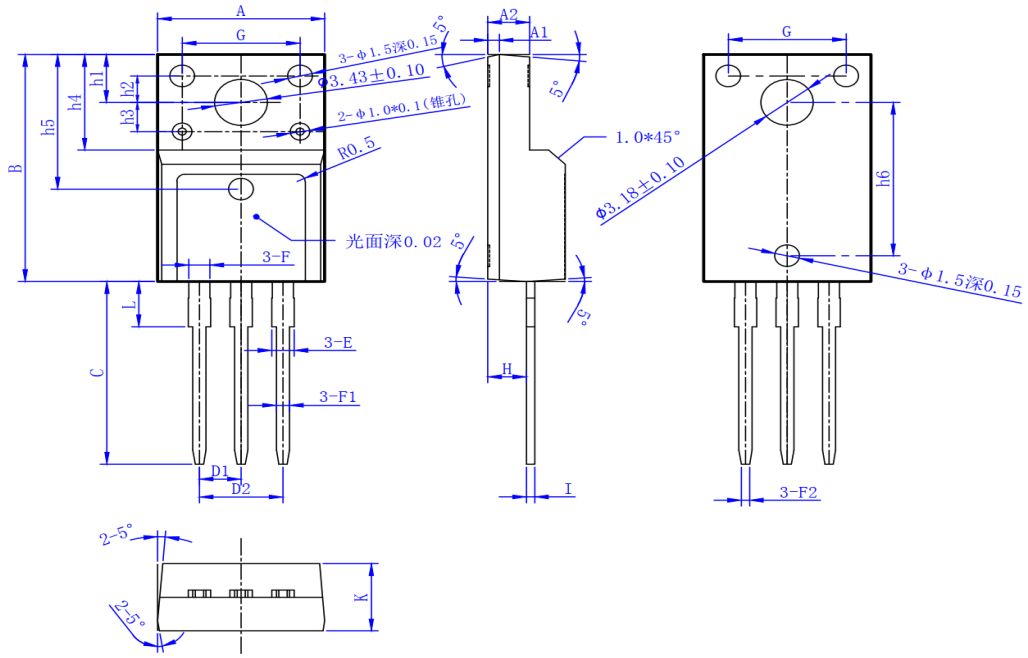


Figure C. Definition of body diodeswitching characteristics



Reverse Recovery Definitions

Package Outline:



SYMBOL	MM		
	MIN	NOM	MAX
*A	10.00	10.20	10.40
A1		0.70	
*A2	2.35	2.55	2.75
*B	15.80	15.90	16.00
*C	13.00	13.25	13.50
*D1		2.54BSC	
*D2		5.08BSC	
*E	1.27	1.32	1.40
F	1.25	1.28	1.30
*F1	0.75	0.80	0.85
F2	0.35	0.40	0.50
G	6.90	7.00	7.10
*H	2.66	2.76	2.86
h1	3.20	3.30	3.40
h2	1.70	1.80	1.90
h3	2.00	2.10	2.20
h4	6.70	6.79	6.90
h5	9.30	9.41	9.50
h6	10.44	10.54	10.64
*I	0.40	0.50	0.60
*K	4.60	4.70	4.80
L	2.90	3.00	3.10
带*为检验尺寸,C之尺寸参考原则必须满足有“尖脚”			

Revision History

Revison	Date	Major changes
1.0		Release of temporary version

Disclaimer

Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. It is suggested to be used under 80 percent of the maximun ratings of the device.

1. When installing the heatsink, please pay attention to the torsional moment and the smoothness of the heatsink.
2. This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control systems..