



Features

- 3rd generation SiC MOSFET technology
- Optimized package with separate driver source pin
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{rr})
- Halogen free, RoHS compliant

Benefits

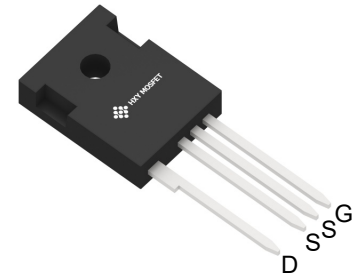
- Reduce switching losses and minimize gate ringing
- Higher system efficiency
- Reduce cooling requirements
- Increase power density
- Increase system switching frequency

Applications

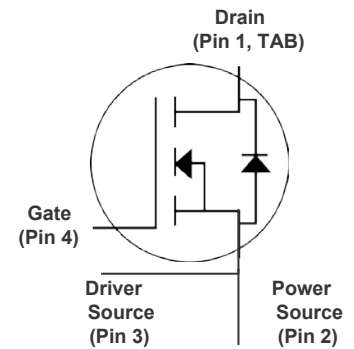
- Renewable energy
- EV battery chargers
- High voltage DC/DC converters
- Switch Mode Power Supplies



Ordering Part Number	Package	Qty(PCS)
SG2M023120LJ	TO-247-4L	30



TO-247-4L



Maximum Ratings ($T_c = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current $T_c = 25^\circ\text{C}$, $V_{GS} = 18\text{V}$ $T_c = 100^\circ\text{C}$, $V_{GS} = 18\text{V}$	I_D	110.4 80.6	A
Pulsed drain current ($T_c = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D\text{ pulse}}$	170	A
Gate-Source voltage	V_{GS}	-10/+22	V
Power dissipation $T_c = 25^\circ\text{C}$ $T_c = 110^\circ\text{C}$	P_{tot}	577 250	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	$^\circ\text{C}$
Thermal resistance, junction case. Max	R_{thJC}	0.26	$^\circ\text{C/W}$



Electrical Characteristics (at $T_J = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Drain-source breakdown voltage	BV _{DSS}	1200	-	-	V	V _{GS} =0V, I _D =100uA
Gate threshold voltage	V _{GS(th)}	2 -	3.2 2.2	5 -	V	V _{DS} =V _{GS} ,I _D =15mA T _C =25°C T _C =175°C
Zero gate voltage drain current	I _{DSS}	- -	1 10	100 100	μA	V _{DS} =1200V,V _{GS} =0V T _C =25°C T _C =175°C
Gate-source leakage current	I _{GSS}	- -	- -	100 100	nA	V _{GS} =22V,V _{DS} =0V V _{GS} =-10V,V _{DS} =0V
Drain-source on-state resistance	R _{DS(on)}	- -	26 43	45 -	mΩ	V _{GS} =18V, I _D =40A, T _J =25°C T _J =175°C
Transconductance	g _{fs}	- -	16.2 17	- -	S	I _{DS} =30A T _C =25°C T _C =175°C
Input Capacitance	C _{iss}	-	3505	-	pF	V _{DS} = 800V V _{GS} = 0V V _{AC} = 25mV f = 1MHz
Output Capacitance	C _{oss}	-	232	-		
Reverse Transfer Capacitance	C _{rss}	-	39	-		
Gate Total Charge	Q _G	-	243	-	nC	V _{DS} = 800V V _{GS} = -3/18V I _D = 30A
Gate-Source charge	Q _{gs}	-	37	-		
Gate-Drain charge	Q _{gd}	-	113	-		
Turn-On Switching Energy	E _{ON}	-	681.03	-	μJ	V _{DD} = 800V V _{GS} = -5/+18V I _D = 30A R _G = 4.7Ω L = 100uH
Turn-Off Switching Energy	E _{OFF}	-	248.22	-		
Turn-on delay time	t _{d(on)}	-	23.13	-	ns	
Rise time	t _r	-	38.25	-		
Turn-off delay time	t _{d(off)}	-	59.94	-		
Fall time	t _f	-	24.3	-		
Gate resistance	R _G	-	1.72	-	Ω	V _{AC} = 25mV, f=1MHz



Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		3.79		V	$V_{GS}=0V, I_{SD}=25A, T_J=25^{\circ}C$
			3.36			$V_{GS}=0V, I_{SD}=15A, T_J=175^{\circ}C$
Continuous Source Current	I_{SD}	-	-	76	ns	$V_{GS}=-3V, T_J=25^{\circ}C$
		-	-	44.8		$V_{GS}=-3V, T_J=100^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	32	-	ns	$V_R = 800V$ $I_D = 30A$ $di/dt = 1000A/\mu S$ $T_J = 25^{\circ}C$
Body Diode Reverse Recovery Charge	Q_{rr}	-	344	-	nC	

Typical Performance Characteristics

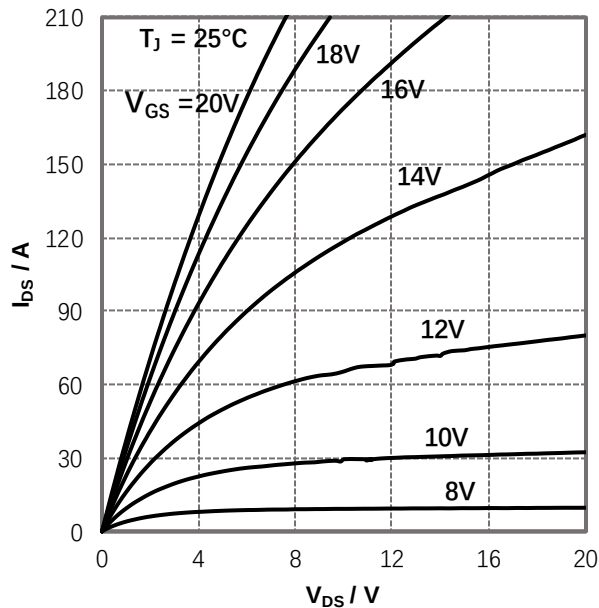


Fig 1. Output Characteristics ($T_J = 25^{\circ}C$)

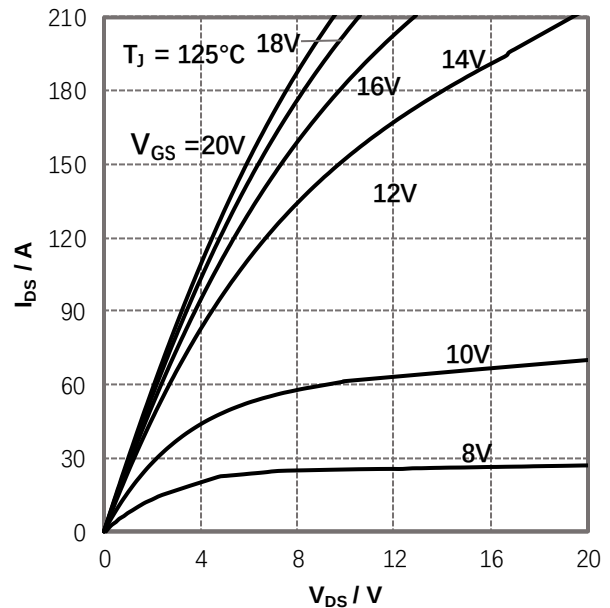


Fig 2. Output Characteristics ($T_J = 125^{\circ}C$)

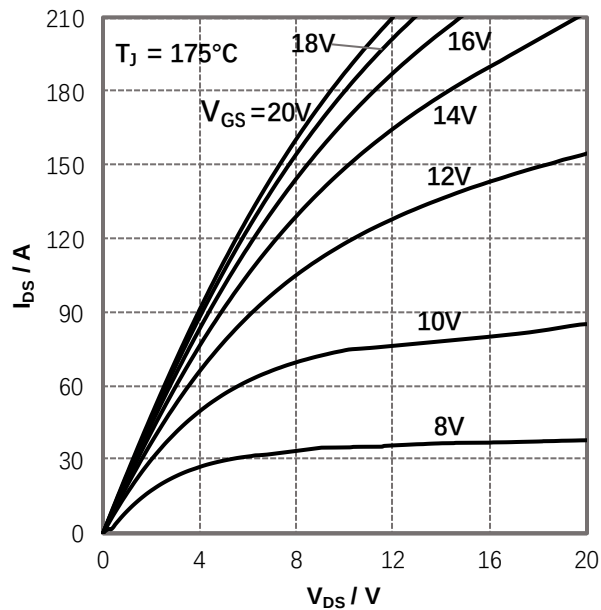


Fig 3. Output Characteristics ($T_J = 175^\circ\text{C}$)

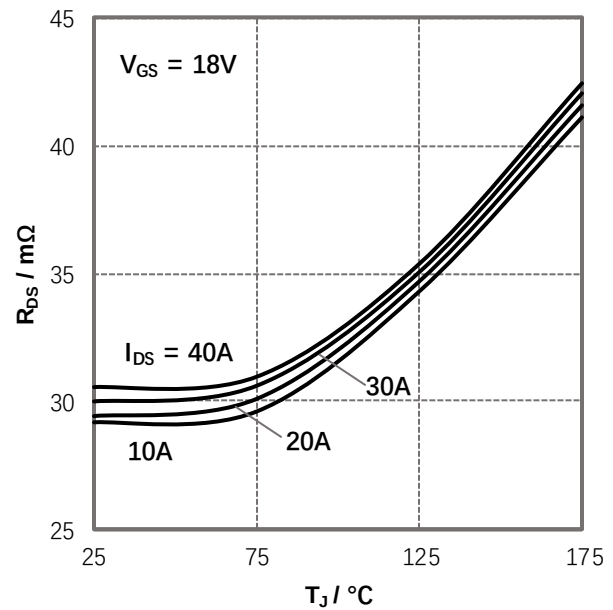


Fig 4: $R_{DS(on)}$ vs. Temperature

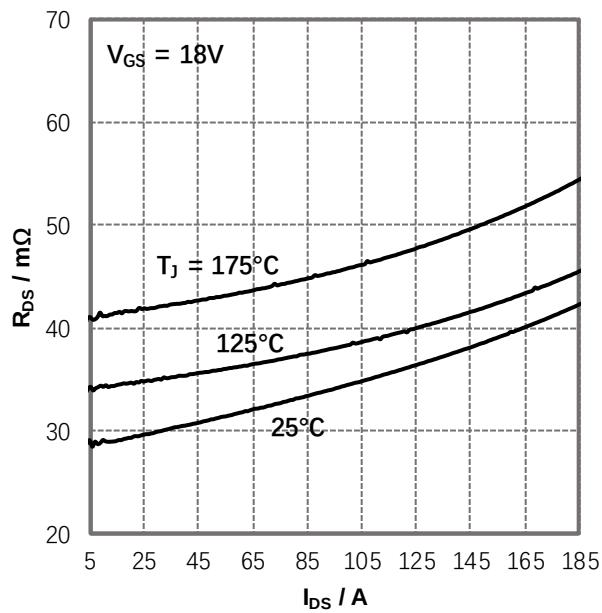


Fig 5. $R_{DS(on)}$ Vs I_{DS} Characteristics

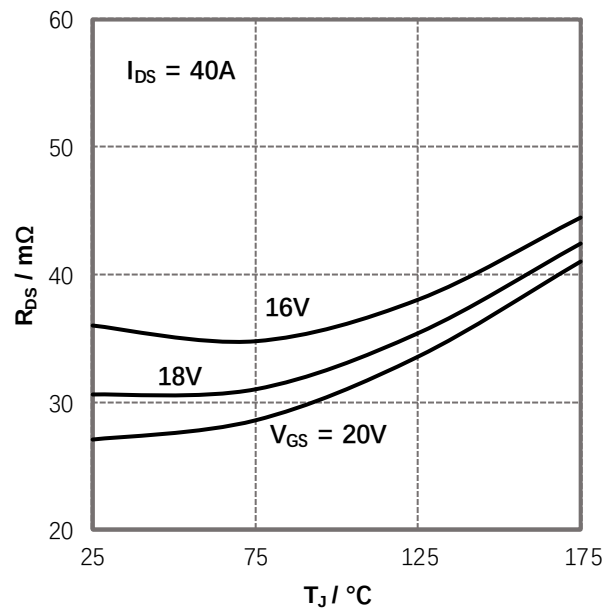


Fig 6. Normalized On-Resistance vs. Temperature

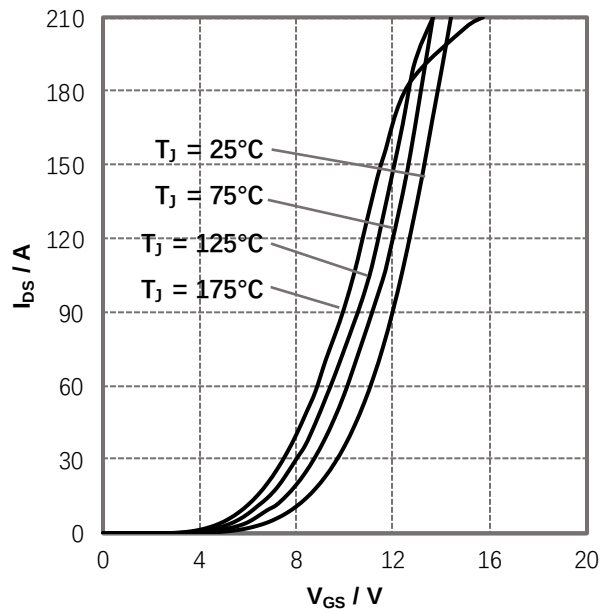


Fig 7. Transfer Characteristics

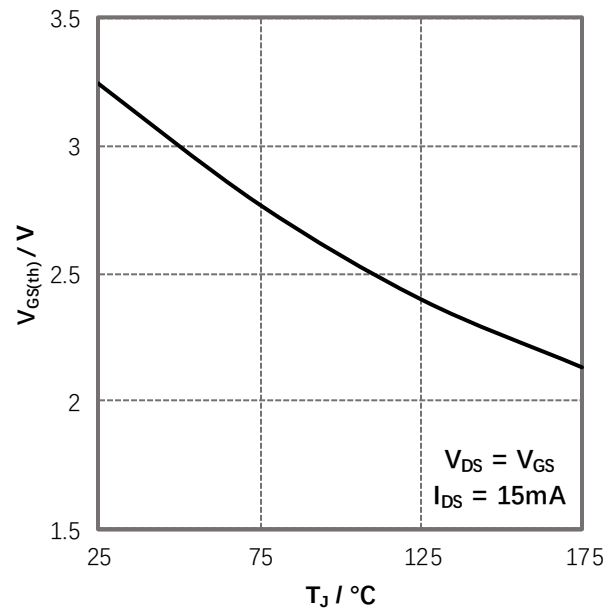


Fig 8. V_{TM} Vs T_J Temperature Characteristics

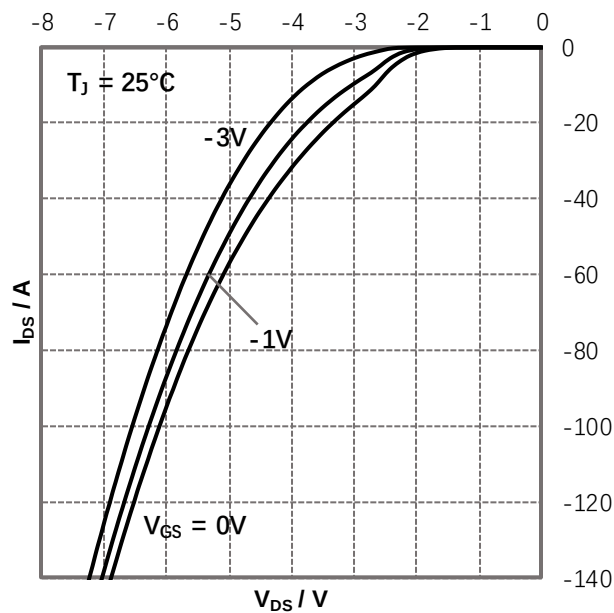


Fig 9. Body-diode Characteristics ($T_J = 25^\circ\text{C}$)

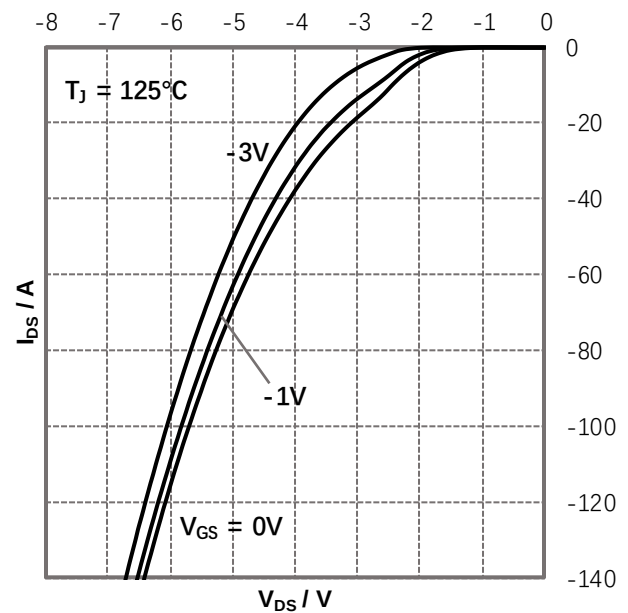


Fig 10. Body-diode Characteristics ($T_J = 125^\circ\text{C}$)

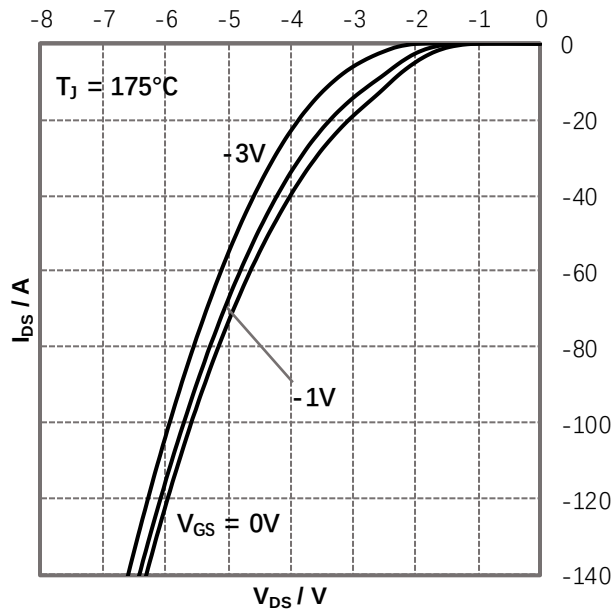


Fig 11. Body-diode Characteristics ($T_j = -175^\circ\text{C}$)

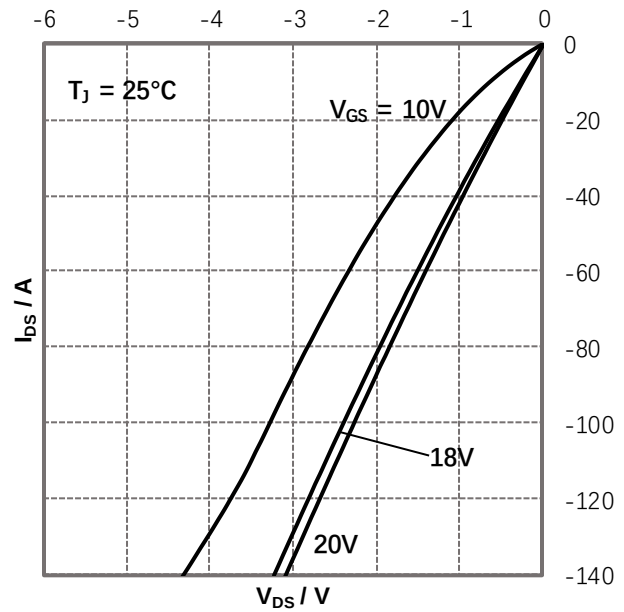


Fig 12. 3rd Quadrant Characteristics ($T_j = -25^\circ\text{C}$)

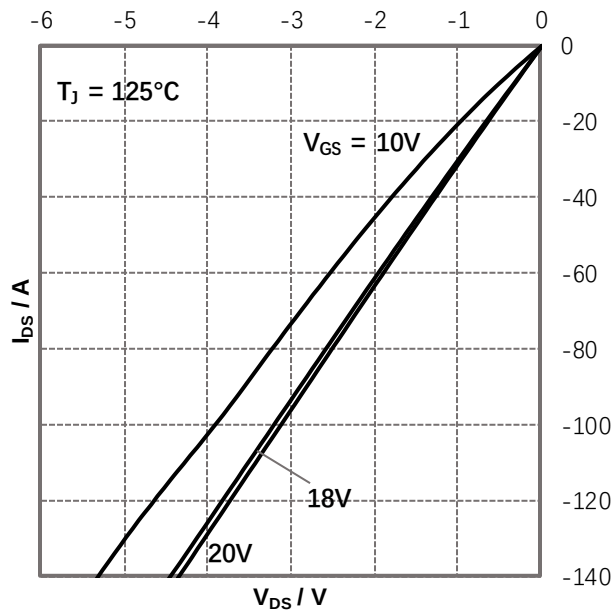


Fig 13. 3rd Quadrant Characteristics ($T_j = -125^\circ\text{C}$)

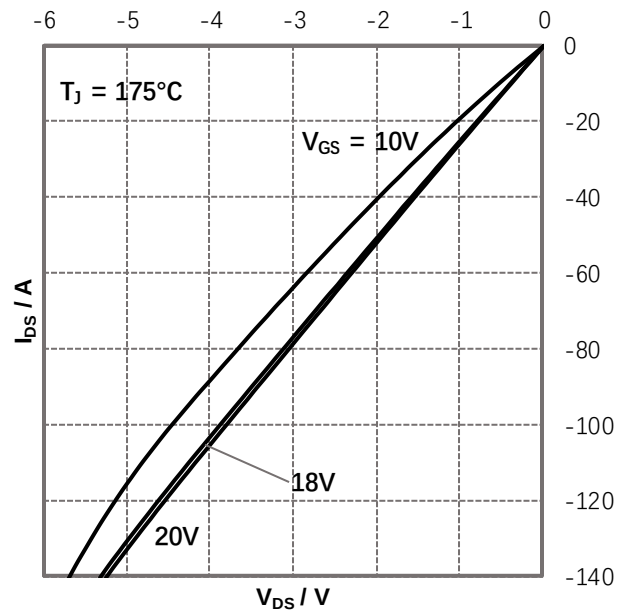


Fig 14. 3rd Quadrant Characteristics ($T_j = -175^\circ\text{C}$)

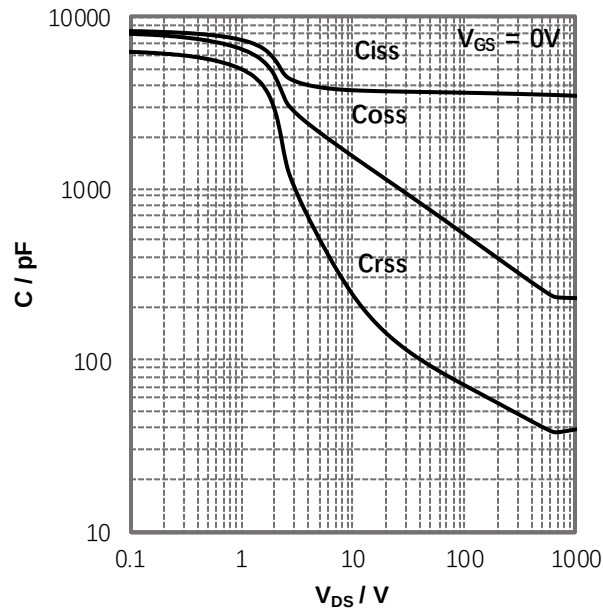


Fig 15. Capacitance Characteristics

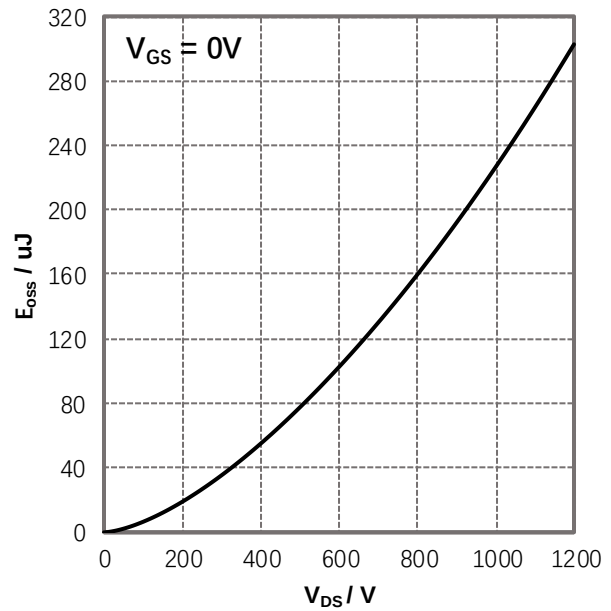


Fig 16. Output Capacitor Stored Energy

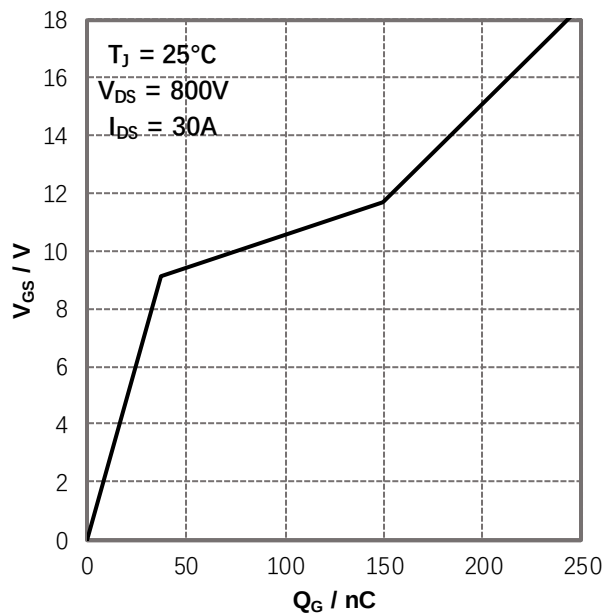


Fig 17. Gate Charge Characteristics

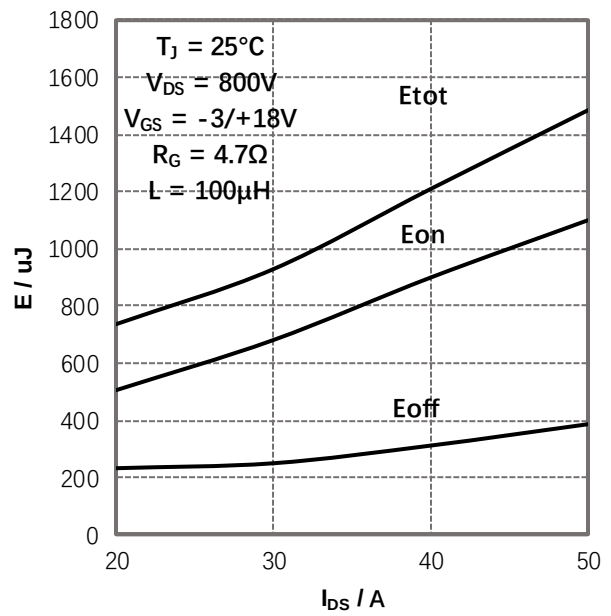


Figure 18. Clamped Inductive Switching Energy vs. Drain Current

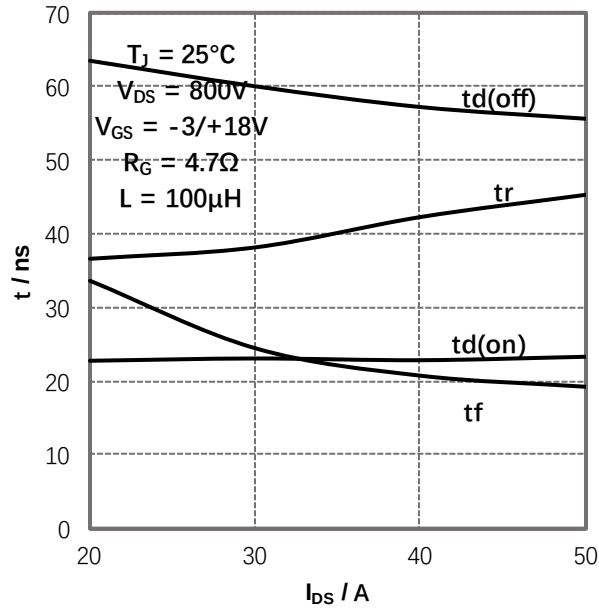


Fig 19. Switching Times vs. I_{DS}

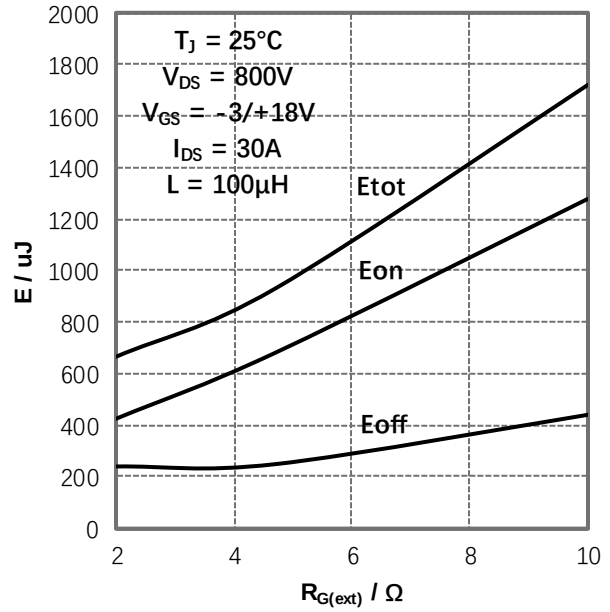


Fig 20. Clamped Inductive Switching Energy vs. Temperature

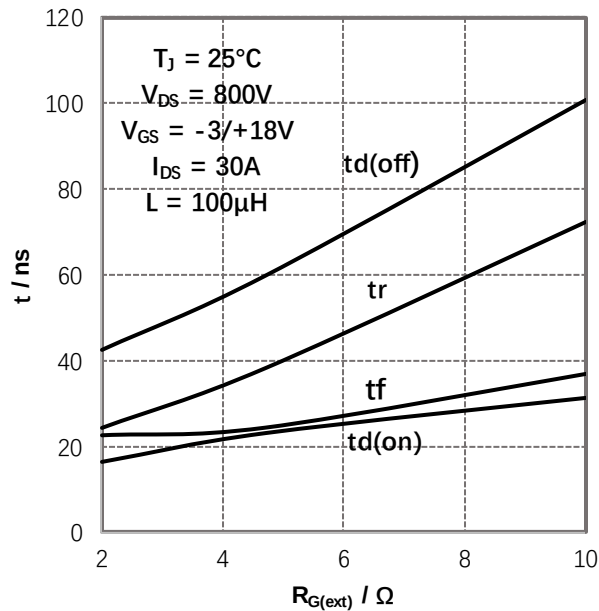


Fig 21. Switching Times vs. R_{G(ext)}

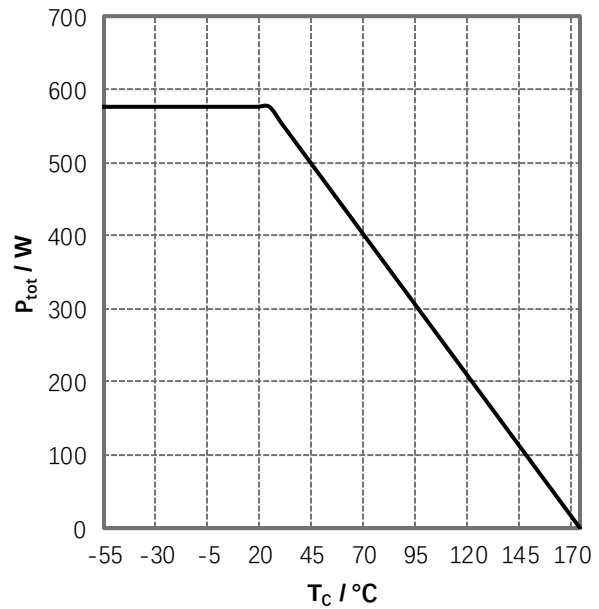


Fig 22. Maximum Power Dissipation Derating vs. Case Temperature

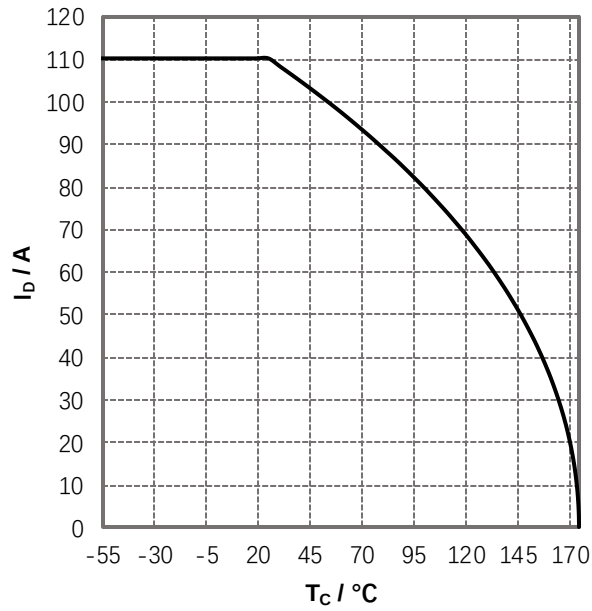


Fig 23. Continuous Drain Current Derating vs. Case Temperature

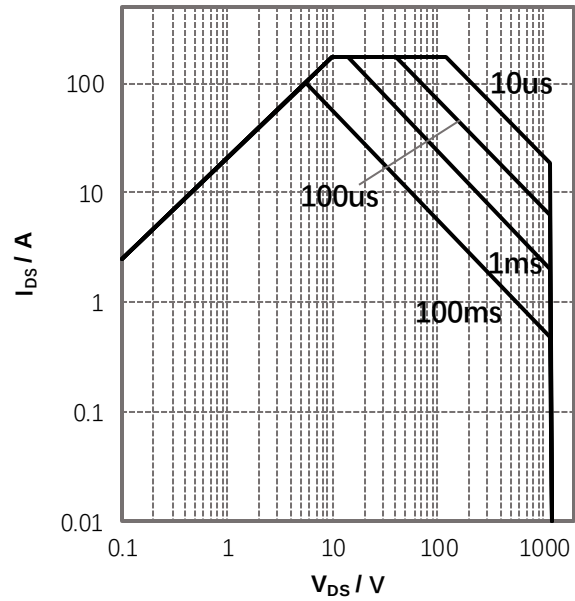


Fig 24. Safe Operating Area

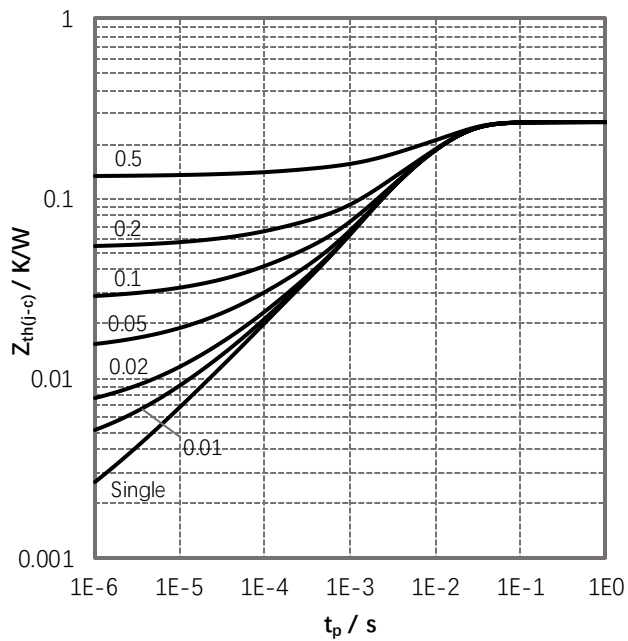
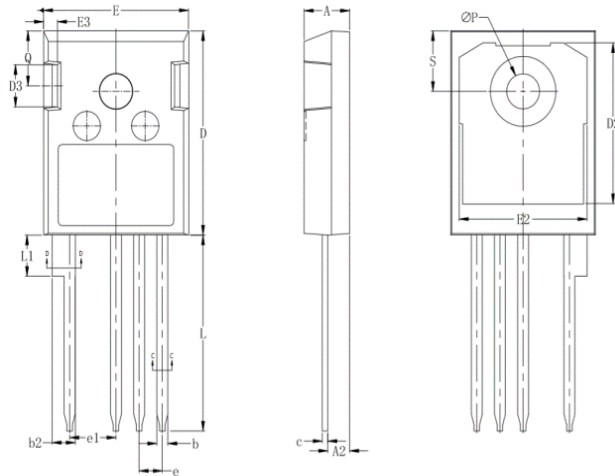


Fig 25. Transient Thermal Impedance



Package Dimensions

Package TO-247-4L



Items	Values(mm)	
	MIN	MAX
A	4.8	5.2
A2	2.2	2.6
b	1.05	1.4
b2	2.4	2.75
c	0.5	0.75
D	20	21.5
D2	15.5	17.2
D3	4	5
E	15.5	16.1
E2	13	15
E3	1	2
e	2.54 BSC.	
e1	5.08 BSC.	
L	19	21
L1	4	4.45
ΦP	3.5	3.7
Q	5.4	5.9
S	5.9	6.4



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