

Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Kelvin gate input easing driver circuit design

Product Summary			
V _{DS}	R _{DS(on)} (mΩ)Typ	I _D (A)	Q _g (Typ)
1700V	14 @ 18V 50A	120	278nc

Mechanical Data

- Case:TO-247-4L Package

Application

- Motor drivers
- Solar inverters
- Automotive DC/DC converters
- Automotive compressor inverters
- Switch mode power supplies

TO-247-4L



Block Diagram

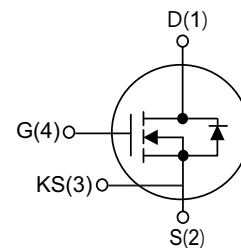


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	1700	V
Gate-Source Voltage(Max)	V _{GS(max)}	-10/+22	V
Recommend Gate-Source Voltage	V _{GSop}	-5/+18	V
Continuous Drain Current	I _D	T _C =25°C	120
		T _C =100°C	85
Pulsed Drain Current (Note 1)	I _{DM}	280	A
Power Dissipation T _C =25°C	P _D	555	W
Operating Junction and Storage Temperature	T _J /T _{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC14N170P4	Unit
Thermal resistance Junction to Case, Max	R _{θJC}	0.27	°C/W
Thermal resistance Junction to Ambient,Max	R _{θJA}	40	°C/W

Table 3. Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV _{DSS}	V _{GS} =0V,I _D =250μA	1700	-	-	V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =1700V,V _{GS} =0V	-	5	100	μA
			V _{DS} =1700V,V _{GS} =0V,T _J =175°C	-	-	3.5	mA
Gate- Source Leakage Current	Forward	I _{GSS}	V _{GS} =22V,V _{DS} =0V	-	-	250	nA
	Reverse		V _{GS} = -10V,V _{DS} =0V	-	-	-250	nA
On Characteristics							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} ,I _D =10mA	2.0	2.8	4.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =15V,I _D =50A,T _J =25°C	-	16	20	mΩ
			V _{GS} =15V,I _D =50A,T _J =175°C	-	26	-	
			V _{GS} =18V,I _D =50A,T _J =25°C	-	14	17.5	
			V _{GS} =18V,I _D =50A,T _J =175°C	-	22.6	-	
Gate Resisitance		R _G	f=1MHz	-	2.0	-	Ω
Dynamic Characteristics							
Input Capacitance		C _{ISS}	V _{DS} =1000V,V _{GS} =0V, f=1MHz,V _{AC} =25mV	-	7280	-	pF
Output Capacitance		C _{OSS}		-	288	-	pF
Reverse Transfer Capacitance		C _{RSS}		-	15	-	pF
Coss stored energy		E _{OSS}		-	168	-	μJ
Turn-on switching energy(Body Diode)		E _{ON}	V _{DS} =1200V,I _D =50A,V _{GS} = -5/18V,	-	1.41	-	mJ
Turn-off switching energy(Body Diode)		E _{OFF}	R _G =2.5Ω,L=68μH,T _J =175°C	-	1.12	-	mJ
Turn-On Delay Time		td(on)	V _{DS} =1200V,I _D =50A V _{GS} =- 5/18V,R _G =2.5Ω, L=68μH,T _J =25°C	-	39	-	ns
Turn-On Rise Time		t _{TR}		-	32	-	ns
Turn-Off Delay Time		td(off)		-	85	-	ns
Turn-Off Fall Time		t _f		-	21	-	ns
Total Gate Charge		Q _G	V _{DD} =1000V,I _D =50A, V _{GS} = -5/18V	-	278	-	nC
Gate-Source Charge		Q _{GS}		-	80	-	nC
Gate-Drain Charge		Q _{GD}		-	92	-	nC
Drain-Source Diode Characteristics and Maximum Ratings (Note 2)							
Drain-Source Diode Forward Voltage		V _{SD}	V _{GS} =0V,I _F =38A	-	3.2	-	V
Continuous Diode Forward Current		I _S	V _{GS} =0V,T _C =25°C	-	120	-	A
Reverse Recovery Time		trr	V _R =1200V,V _{GS} =- 5V,I _F =38A di/dt=1300A/μs,T _J =175°C	-	98	-	ns
Recovered charge		Q _{rr}		-	728	-	nC
Peak reverse recovery current		I _{rrm}		-	18	-	A

Notes: 1 RepetitiveRating Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

Typical Characteristics Diagrams

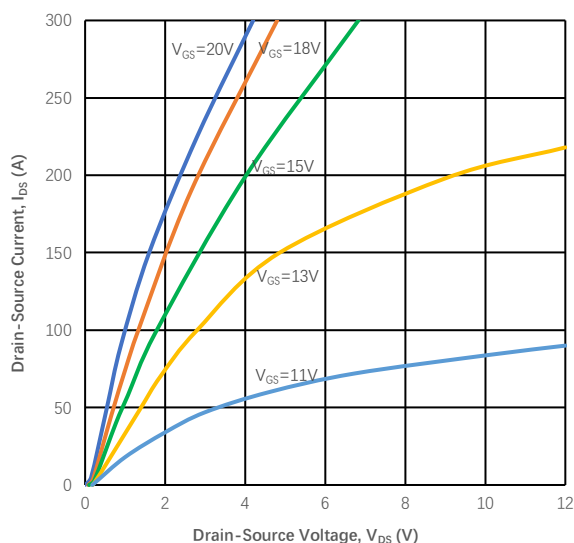


Figure 1

Output Characteristics ($T_J = 25^\circ\text{C}$)

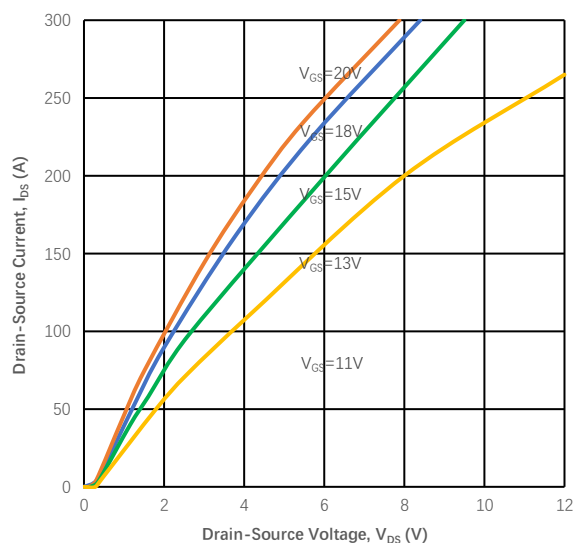


Figure 2

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

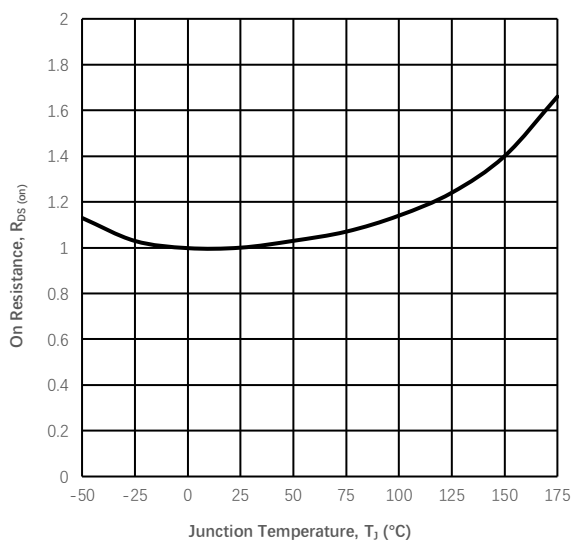


Figure 3

Normalized On-Resistance vs. Temperature

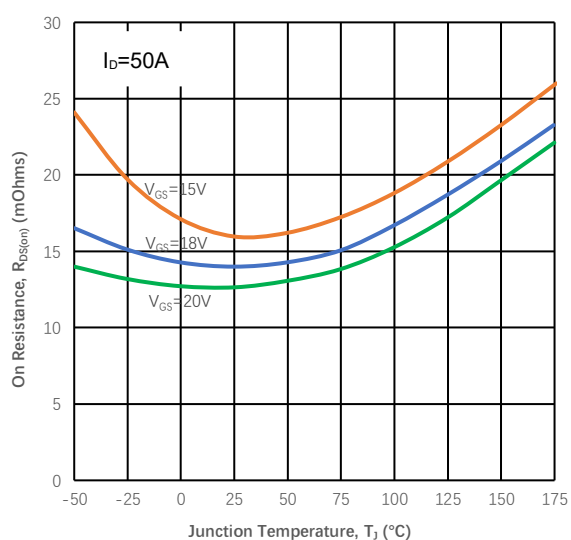


Figure 4

On-Resistance vs. Temperature

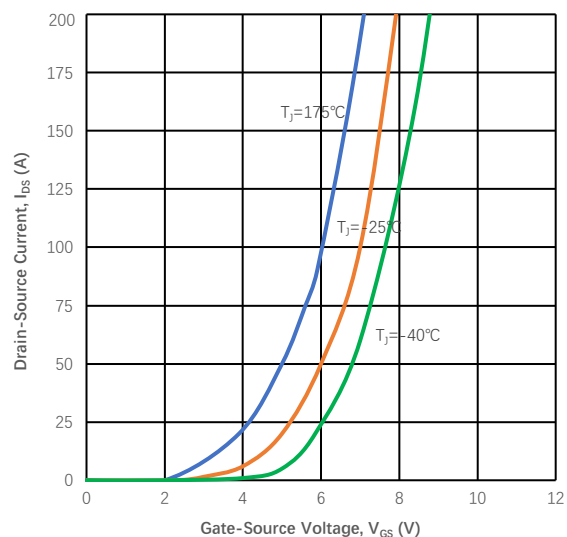


Figure 5

Transfer Characteristic

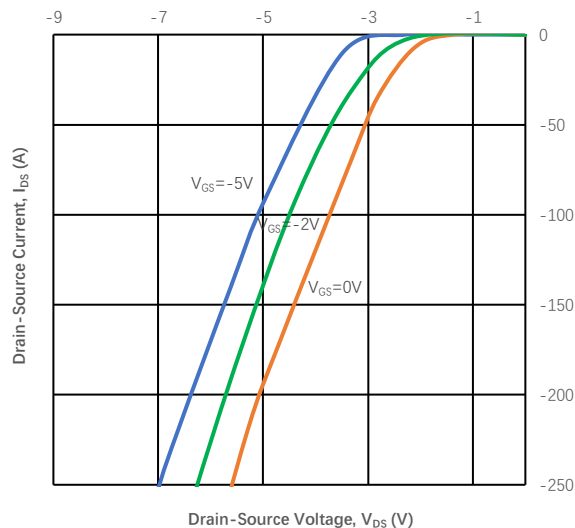


Figure 6

Body Diode Characteristic at 25°C

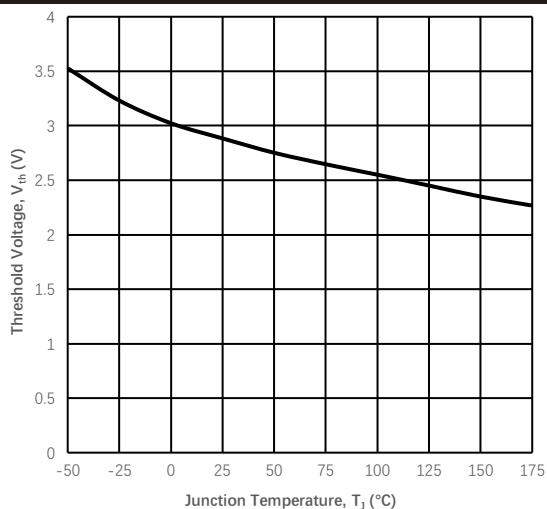


Figure 7
Threshold Voltage vs. Temperature

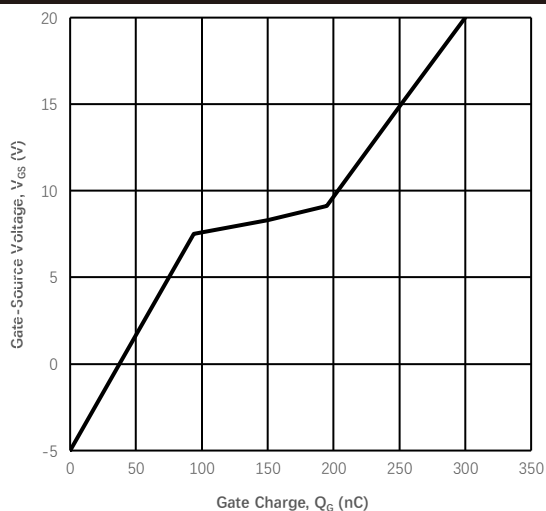


Figure 8
Gate Charge Characteristics

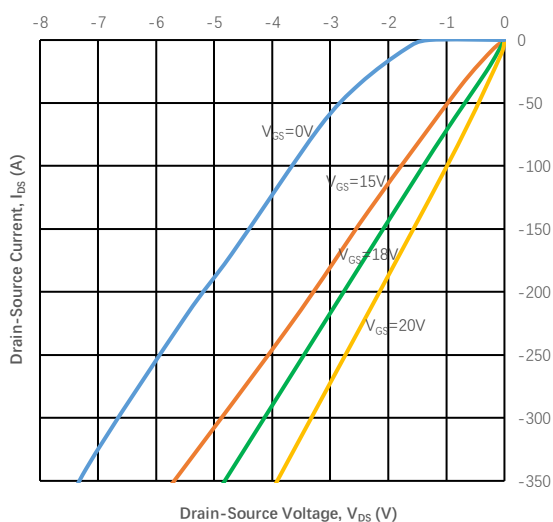


Figure 9
3rd Quadrant Characteristic at 25°C

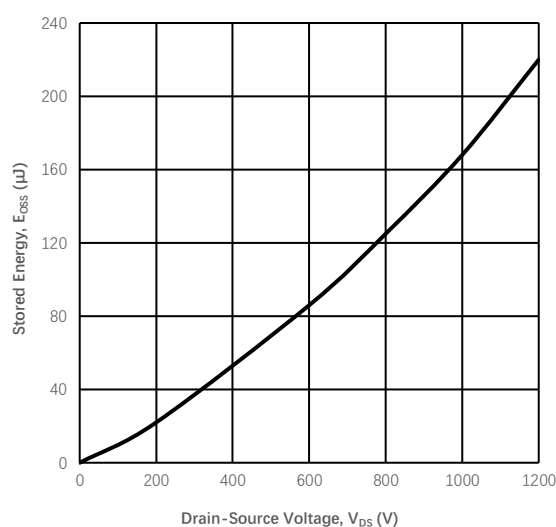


Figure 10
Output Capacitor Stored Energy

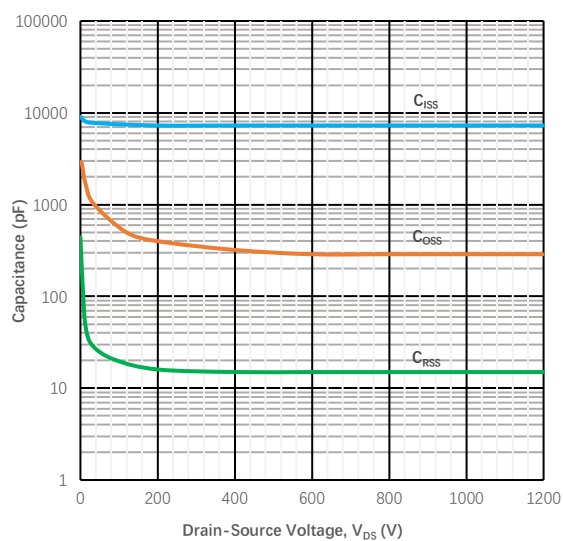


Figure 11
Capacitances vs. Drain-Source

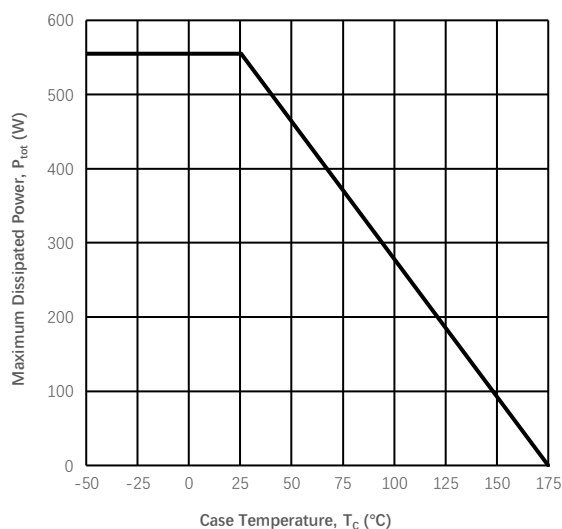


Figure 12
Max Power Dissipation Derating vs T_c

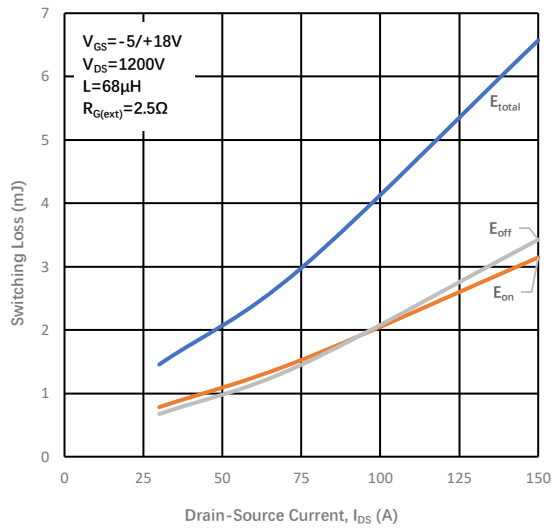


Figure 13
Switching Energy vs. Drain Current

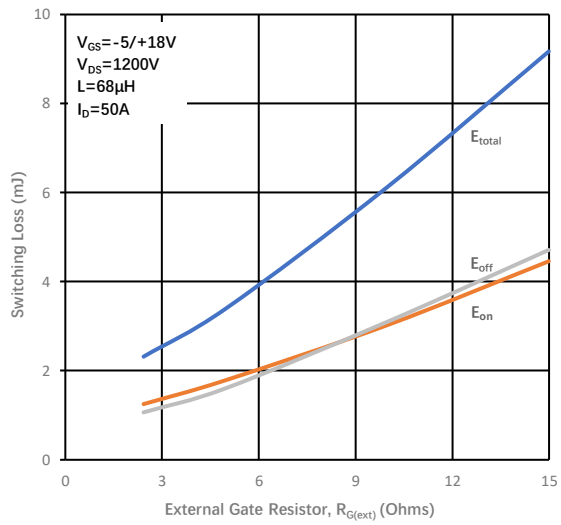


Figure 14
Switching Energy vs. $R_{G(ext)}$

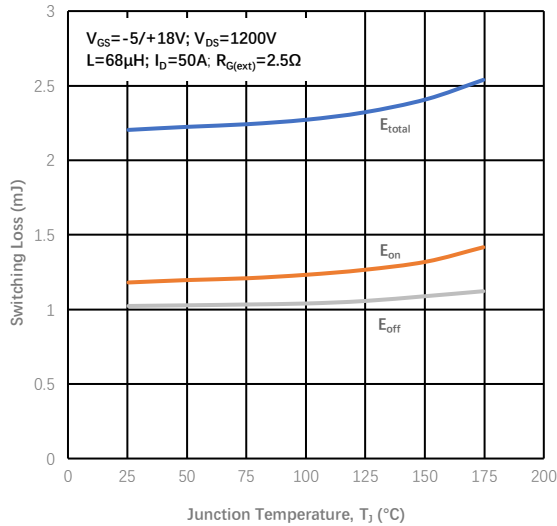


Figure 15
Switching Energy vs. Temperature

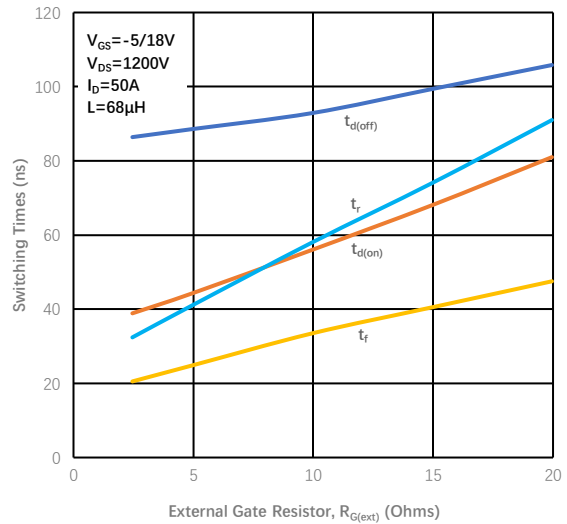


Figure 16
Switching Times vs. $R_{G(ext)}$

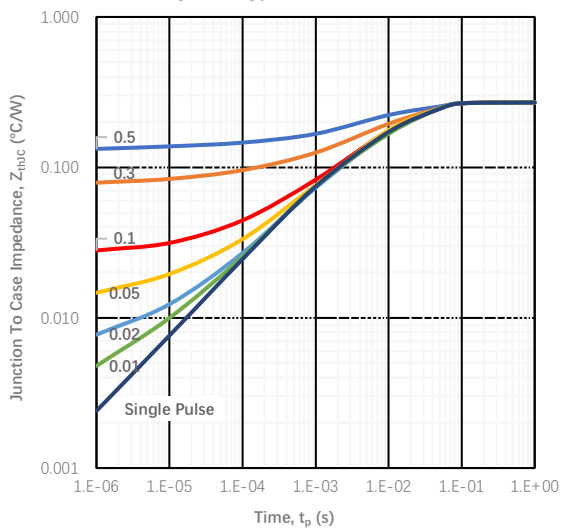


Figure 17
Transient Thermal Impedance

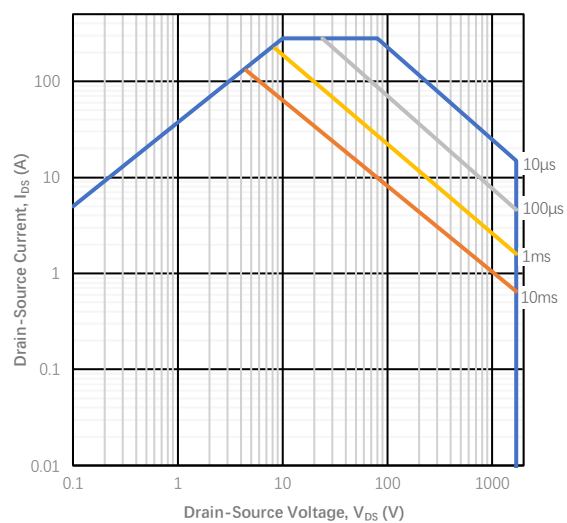
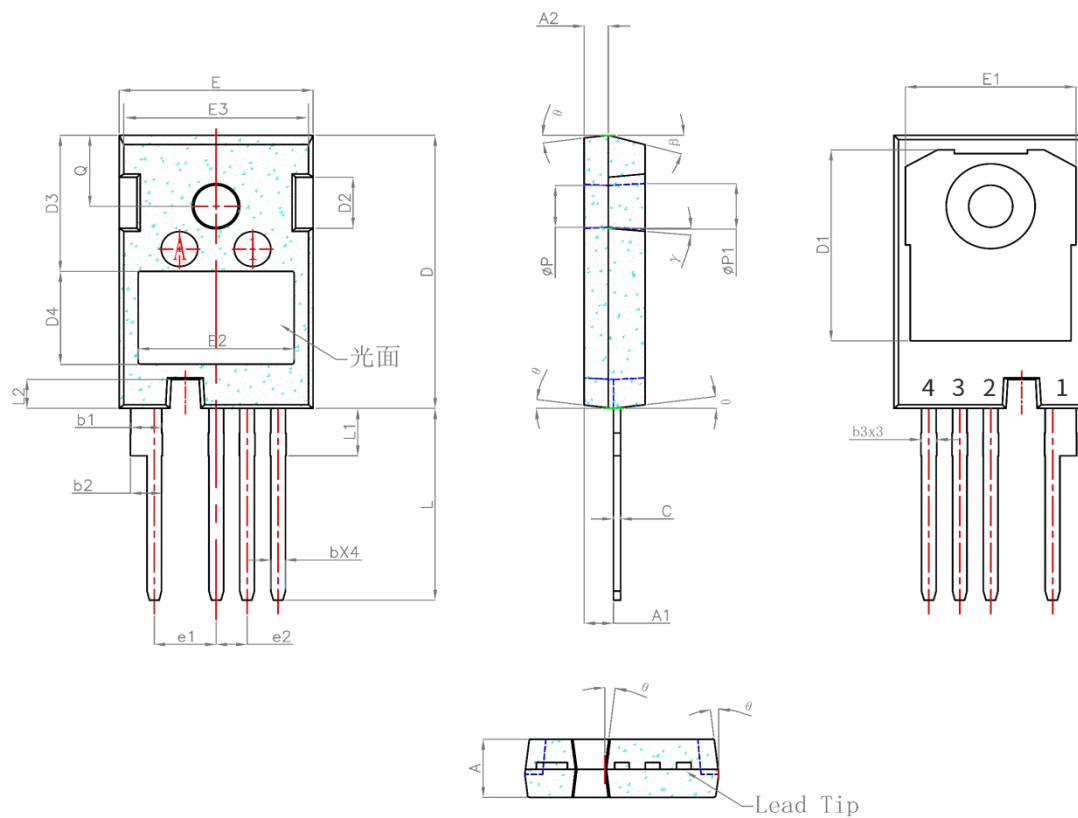


Figure 18
Safe Operating Area

Dimensions

TO-247-4L package



Symbol	Millimeters			Symbol	Millimeters		
	Min.	Type.	Max.		Min.	Type.	Max.
A	4.80	5.00	5.20	e2	2.39	2.54	2.69
A1	2.25	2.40	2.55	E	15.70	15.90	16.10
A2	1.85	2.00	2.15	E1	13.80	14.00	14.20
b	1.15	1.20	1.25	E2	12.80 Type.		
b1	2.40	2.55	2.70	E3	12.80	13.00	13.20
b2	2.48	2.63	2.78	L	16.32	16.52	16.72
b3	1.13	1.28	1.43	L1	3.87	4.07	4.27
c	0.55	0.60	0.65	L2	2.30	2.50	2.70
D	-	23.50	23.70	φP	3.45	3.60	-
D1	16.20	16.50	16.80	φP1	3.90 Type.		
D2	4.40 Type.			Q	6.01	6.11	6.21
D3	11.61	11.71	11.81	θ	7°		
D4	8.00 Type.			β	15°		
e1	4.93	5.08	5.23	γ	5°		

Pin	Symbol	Description
1	D	Drain
2	S	Power Source
3	S	Driver Source
4	G	Gate
mb	D	Mounting Base; Connected to Drain

Note:

1. All metal surfaces are Sn plated (matte), except area of cut.
2. Burr or mold flash size (0.5 mm) is not included in the dimensions.

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