



Features

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

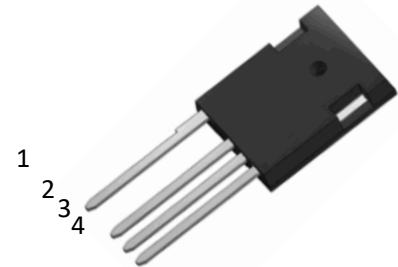
Benefits

- Higher system efficiency
- Reduce cooling requirements
- Increase power density
- Increase system switching frequency

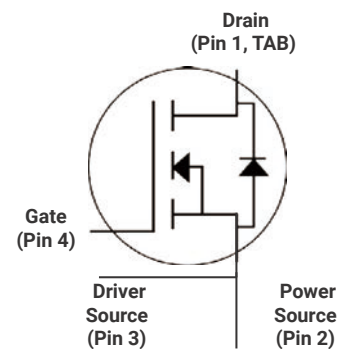
Applications

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

Ordering Part Number	Package	Marking
HC3M0015120K	TO-247-4L	HC3M0015120K



TO-247-4L
Package



Maximum Ratings (T_c = 25 °C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DS}	1200	V
Continuous drain current T _c = 25°C T _c = 100°C	I _D	117 84	A
Pulsed drain current (T _c = 25°C, t _p limited by T _{jmax})	I _D pulse	250	A
Gate-Source voltage	V _{GS}	-4/+18	V
Gate-Source voltage (dynamic, Absolute maximum values)	V _{GSmax}	-8/+22	V
Power dissipation (T _c = 25°C)	P _{tot}	556	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}	0.27	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

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

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV _{DSS}	1200	-	-	V	V _{GS} =0V, I _D =250uA
Gate threshold voltage	V _{GS(th)}	2	-	4	V	V _{DS} =V _{GS} ,I _D =25mA
Zero gate voltage drain current	I _{DSS}	- -	1 10	50 -	μA	V _{DS} =1200V,V _{GS} =0V T _J =25°C T _J =175°C
Gate-source leakage current	I _{GSS}	-		200	nA	V _{GS} =18V,V _{DS} =0V
Drain-source on-state resistance	R _{DS(on)}	- -	33 50	49 -	mΩ	V _{GS} =20V, I _D =80A, T _J =25°C T _J =175°C
Transconductance	g _{fs}	-	27	-	S	V _{DS} =20V,I _D =40A
Dynamic Characteristic						
Input Capacitance	C _{iss}	-	4508	-	pF	V _{DS} = 1000V V _{GS} = 0V T _J = 25°C V _{AC} = 25mV f = 1MHz
Output Capacitance	C _{oss}	-	214	-		
Reverse Transfer Capacitance	C _{rss}	-	26	-		
Gate Total Charge	Q _G	-	222	-	nC	V _{DS} = 800V V _{GS} = -0/18V I _D = 80A
Gate-Source charge	Q _{gs}	-	46.4	-		
Gate-Drain charge	Q _{gd}	-	77.6	-		
Turn-On Switching Energy	E _{ON}	-	2290	-	μJ	V _{DD} = 800V V _{GS} = -4/+18V I _D = 80A R _G = 5Ω L = 120uH
Turn-Off Switching Energy-	E _{OFF}	-	630			
Turn-on delay time	t _{d(on)}	-	49.2	-	ns	
Rise time	t _r	-	14.2	-		
Turn-off delay time	t _{d(off)}	-	21.7	-		
Fall time	t _f	-	11.3	-		
Gate resistance	R _G	-	0.9	-	Ω	V _{AC} = 25mV, f=1MHz



Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		4.4		V	$V_{GS}=0V, I_{SD}=40A,$ $T_J=25^{\circ}C$
			3.9			$V_{GS}=0V, I_{SD}=40A,$ $T_J=175^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	29.6	-	ns	$V_R = 400V,$ $I_D = 80A$ $di/dt = 1000A/\mu S$
Body Diode Reverse Recovery Charge	Q_{rr}	-	272	-	nC	



Typical Performance Characteristics

Fig 1. Output Characteristic ($T_J = -55^\circ\text{C}$)

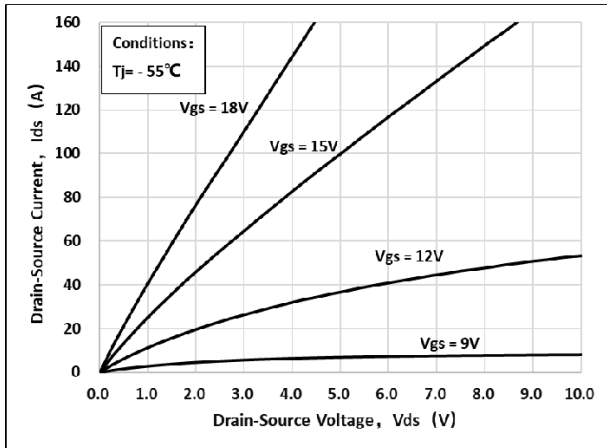


Fig 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

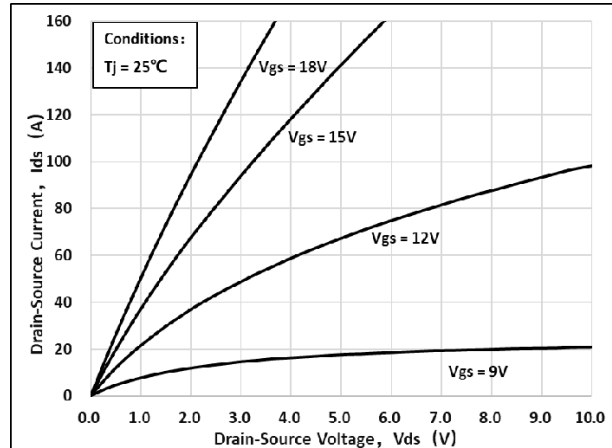


Fig 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

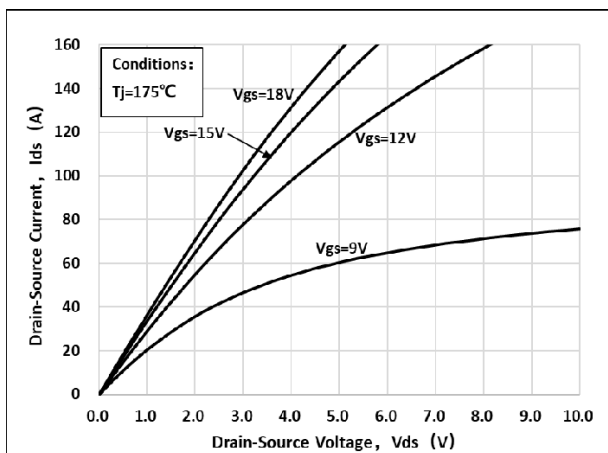


Fig 4: $R_{DS(on)}$ Vs I_{DS} Characteristic

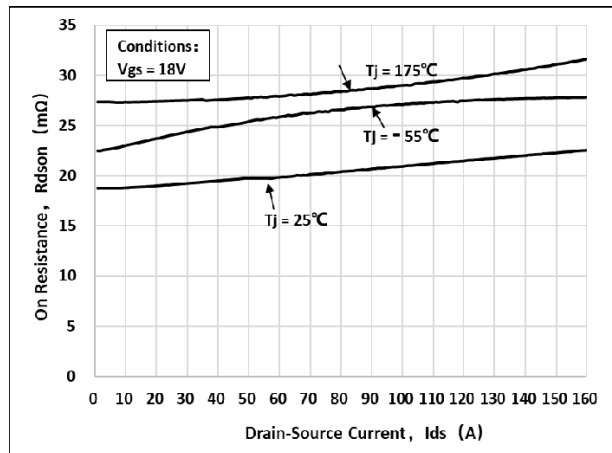


Fig 5: $R_{DS(on)}$ vs. Temperature

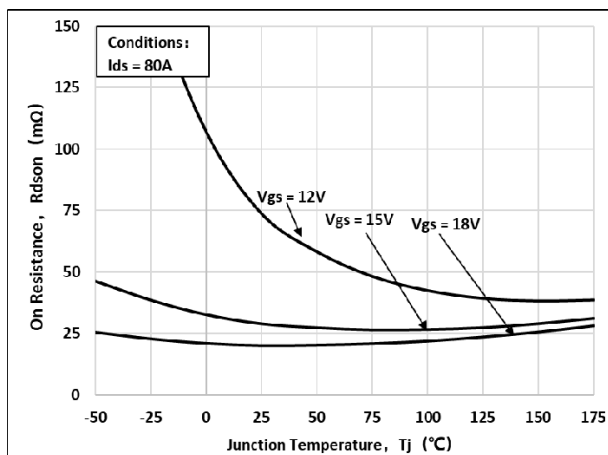


Fig 6: Transfer Characteristic

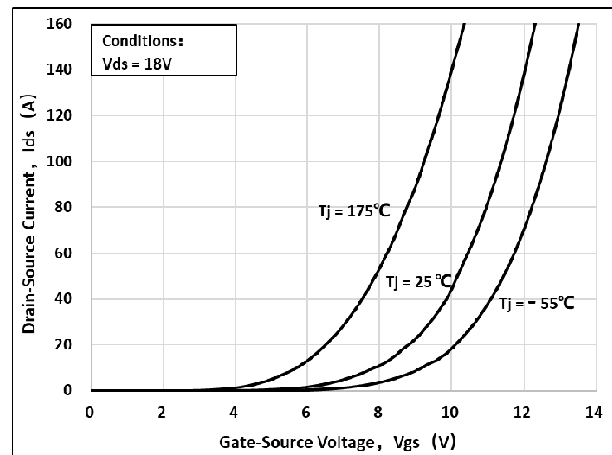




Fig 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)

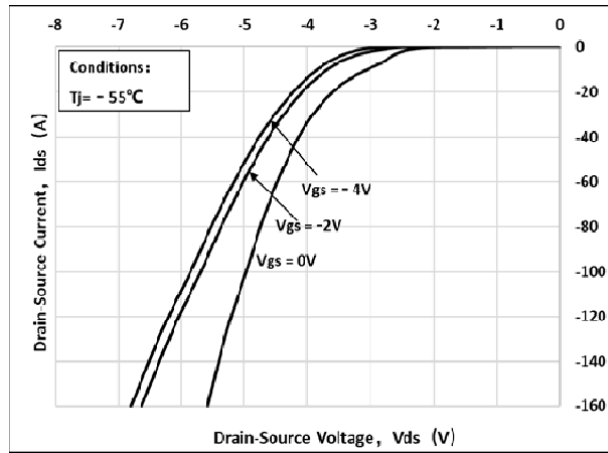


Fig 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

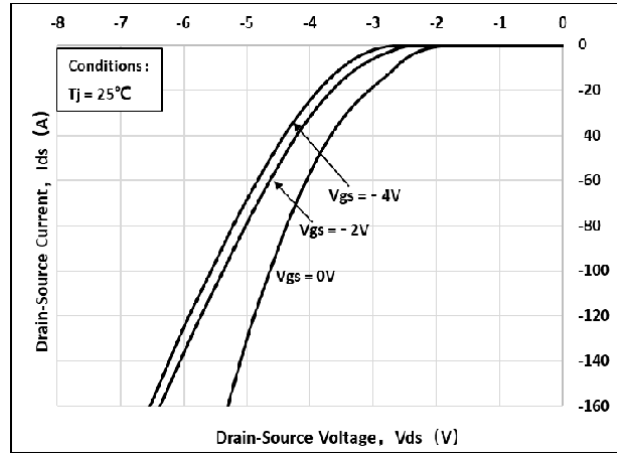


Fig 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

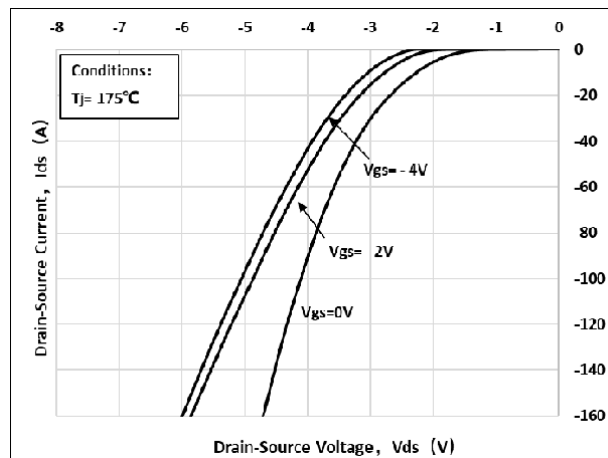


Fig 10: V_{th} Vs T_J Temperature Characteristic

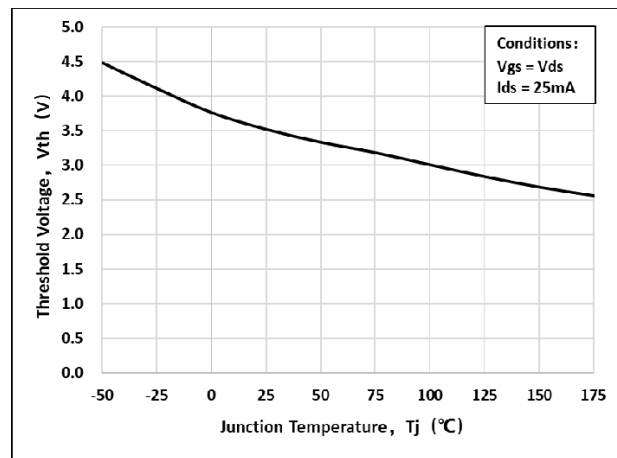


Fig 11: Gate Charge Characteristics

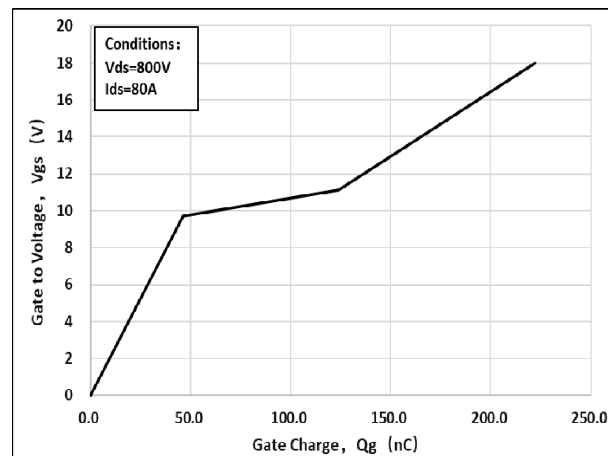


Fig 12: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

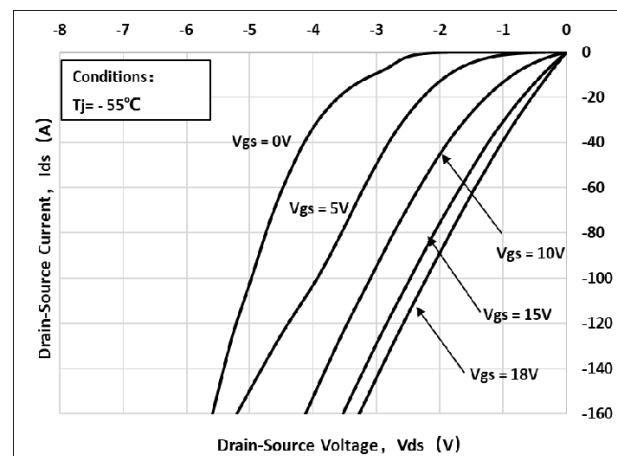




Fig 13: 3rd Quadrant Characteristic($T_J=25^{\circ}\text{C}$)

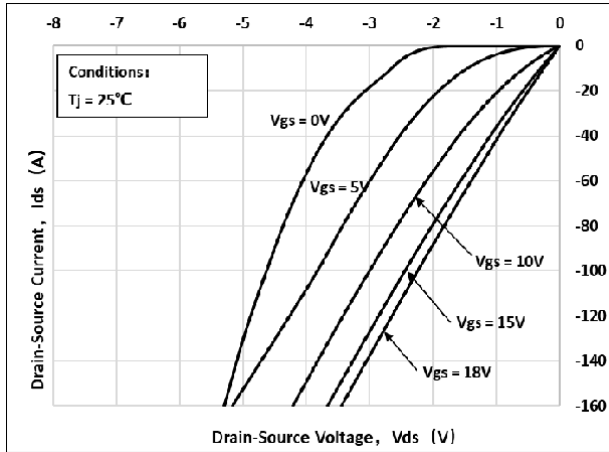


Fig 14: 3rd Quadrant Characteristic($T_J=175^{\circ}\text{C}$)

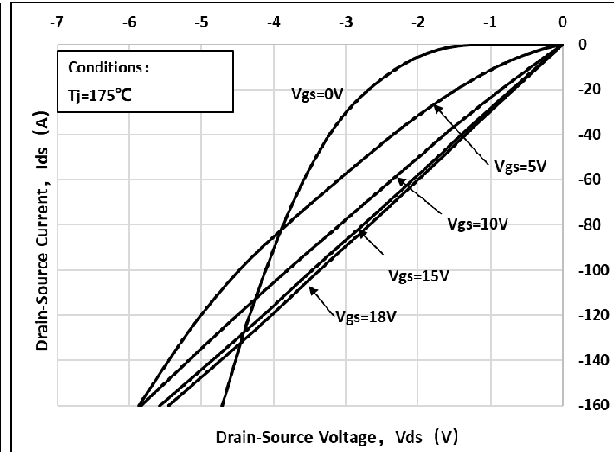


Fig 15: Capacitance Characteristic

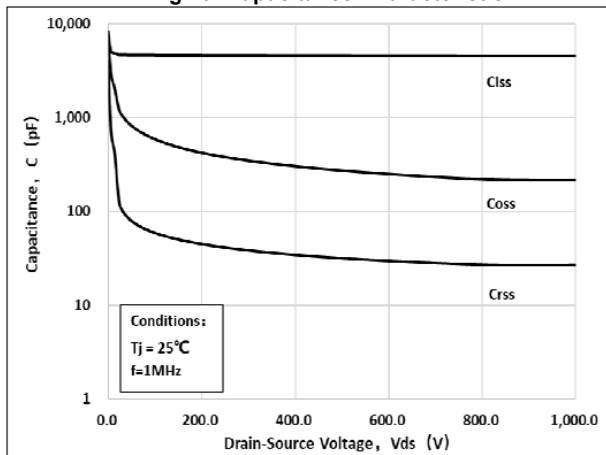


Fig 16: Safe Operating Area

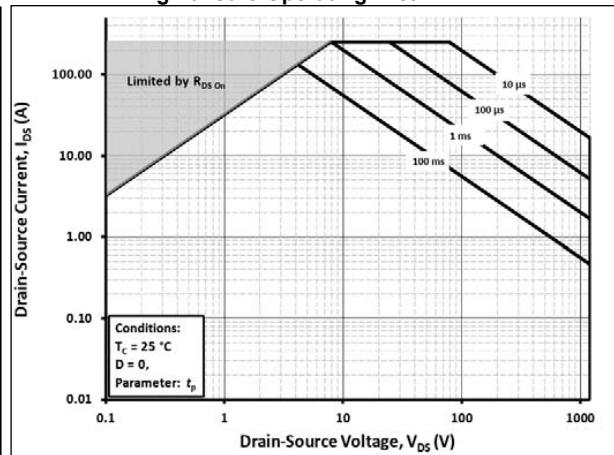
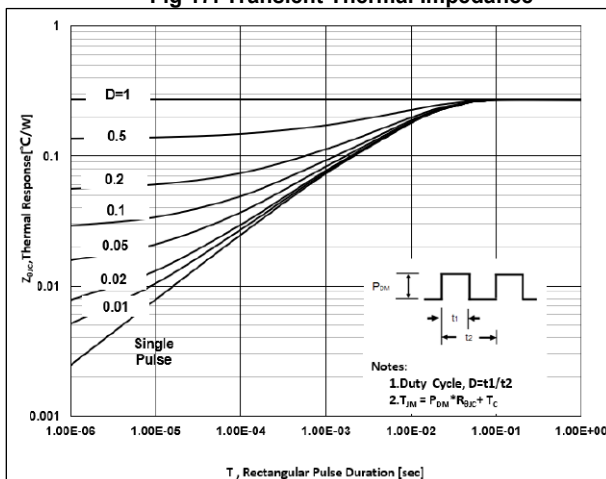


Fig 17: Transient Thermal Impedance





Test Circuit Schematic

Figure A. Definition of switching times

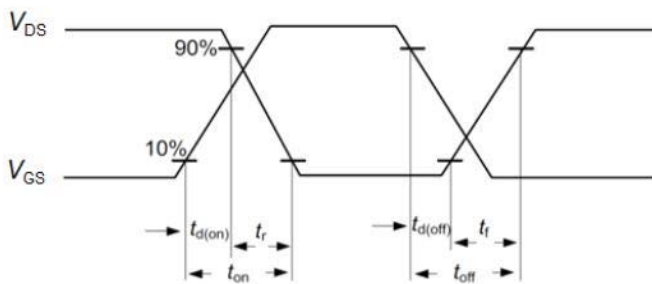


Figure B. Dynamic test circuit

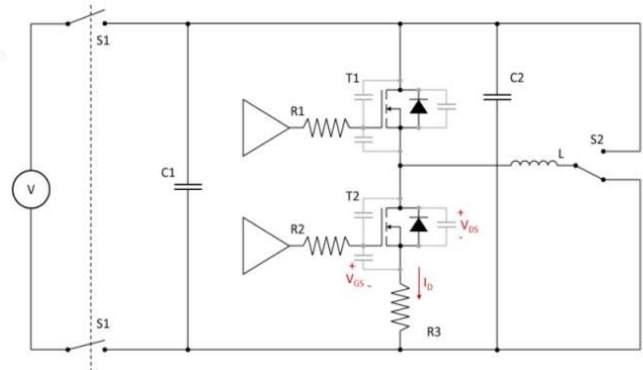


Figure C. Definition of body diodeswitching characteristics

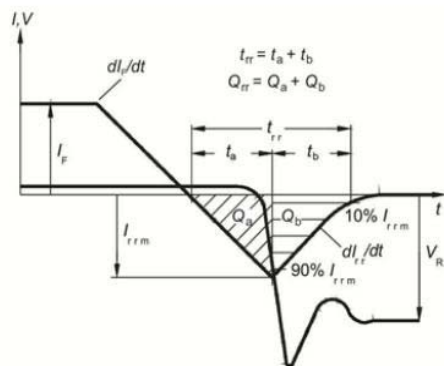
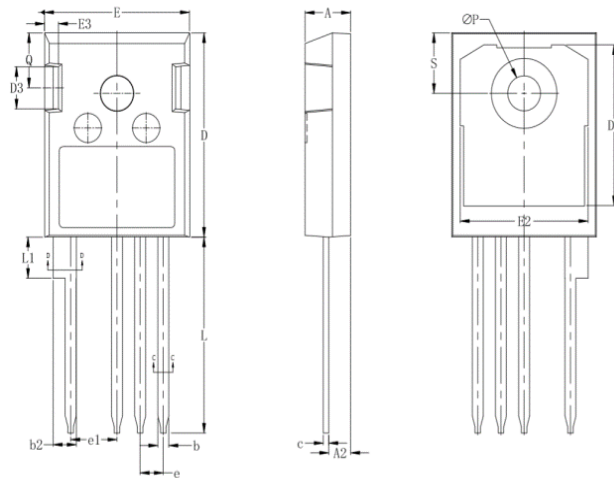


Figure C. Definition of diode switching characteristics



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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