



Features

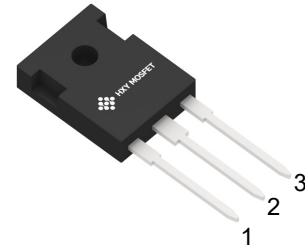
- 3rd generation SiC MOSFET technology
- Optimized package with separate driver source pin
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{rr})
- Halogen free, RoHS compliant

Benefits

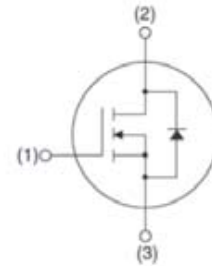
- Reduce switching losses and minimize gate ringing
- Higher system efficiency
- Reduce cooling requirements
- Increase power density
- Increase system switching frequency

Applications

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



TO-247



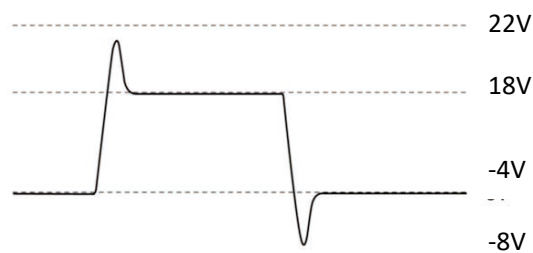
Ordering Part Number	Package	Qty(PCS)
TW140N120C,S1F	TO-247	30



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 $T_c = 25^\circ\text{C}$ $T_c = 100^\circ\text{C}$	I_D	17 12	A
Pulsed drain current ($T_c = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	34	A
Avalanche energy, single pulse ($L=10\text{mH}$)	E_{AS}	1000	mJ
Gate-Source voltage	V_{GS}	-4/+18	V
Gate-Source voltage (dynamic, Absolute maximum values)	V_{GSmax}	-8/+22	V
Power dissipation ($T_c = 25^\circ\text{C}$)	P_{tot}	116	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	$^\circ\text{C}$

- Example of acceptable V_{GS} waveform





Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	1.29	°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 =100uA
Gate threshold voltage	V _{GS(th)}	2	3.1	4	V	V _{DS} =V _{GS} ,I _D =2.3mA
Zero gate voltage drain current	I _{DSS}	- -	1 5	20 -	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)}	- -	160 250	208 -	mΩ	V _{GS} =18V,I _D =8A, T _J =25°C T _J =175°C
Transconductance	g _{fs}	-	5	-	S	V _{DS} =20V,I _D =40A
Dynamic Characteristic						
Input Capacitance	C _{iss}	-	624	-	pF	V _{DS} = 1000V V _{GS} = 0V T _J = 25°C V _{AC} = 25mV f = 1MHz
Output Capacitance	C _{oss}	-	42	-		
Reverse Transfer Capacitance	C _{rss}	-	6	-		
Gate Total Charge	Q _G	-	37.4	-	nC	V _{DS} = 800V V _{GS} = -0/18V I _D =8A I _G =10mA
Gate-Source charge	Q _{gs}	-	5.3	-		
Gate-Drain charge	Q _{gd}	-	20.6	-		
Turn-On Switching Energy	E _{ON}	-	11	-	μJ	V _{DD} = 800V V _{GS} = -4/+18V I _D =8A R _G = 5Ω L = 120uH
Turn-Off Switching Energy-	E _{OFF}	-	230			
Turn-on delay time	t _{d(on)}	-	12.25	-	ns	
Rise time	t _r	-	18.68	-		
Turn-off delay time	t _{d(off)}	-	17.37	-		
Fall time	t _f	-	11.82	-		
Gate resistance	R _G	-	3.3	-	Ω	



Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		3.6		V	$V_{GS}=0V, I_{SD}=40A,$ $T_J=25^{\circ}C$
			3.2			$V_{GS}=0V, I_{SD}=40A,$ $T_J=175^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	13.5	-	ns	$V_R = 400V,$ $I_D = 8A$ $di/dt = 1000A/\mu S$ $T_J=25^{\circ}C$
Body Diode Reverse Recovery Charge	Q_{rr}	-	36.8	-	nC	



Typical Performance Characteristics

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

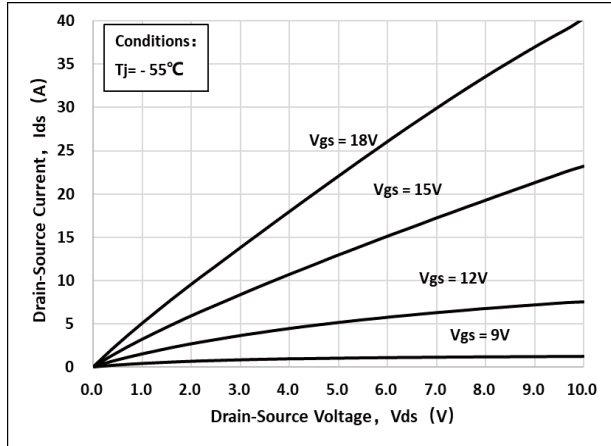


Fig 2. Output Characteristic ($T_J = 25^\circ\text{C}$)

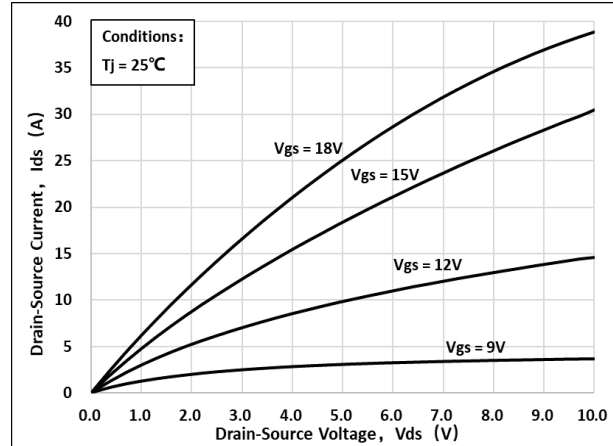


Fig 3. Output Characteristic ($T_J = 175^\circ\text{C}$)

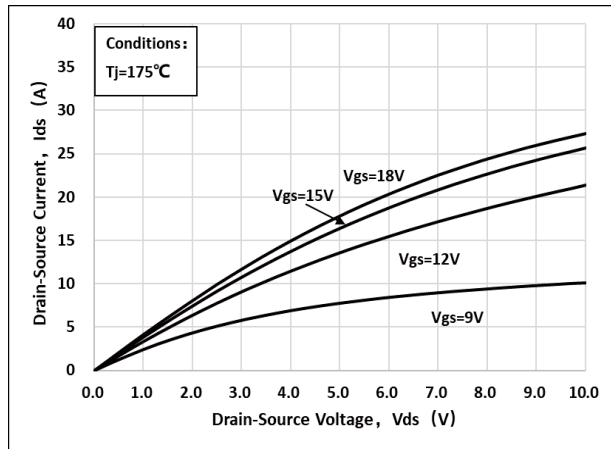


Fig 4: $R_{ds(on)}$ Vs I_{ds} Characteristic

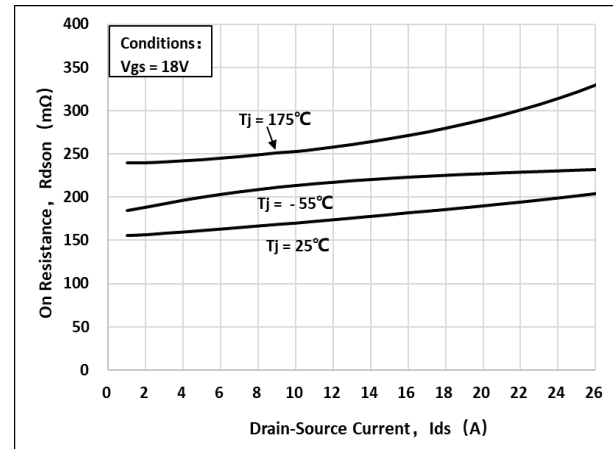


Fig 5: $R_{ds(on)}$ vs. Temperature

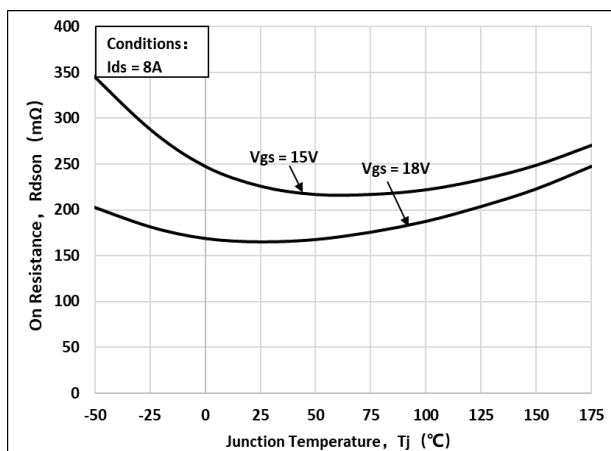


Fig 6: Transfer Characteristic

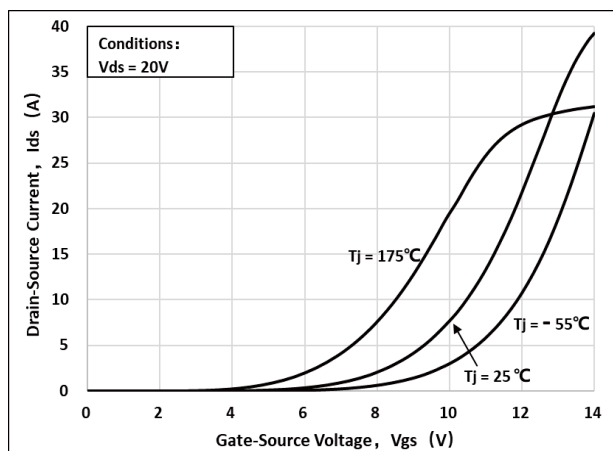




Fig 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)

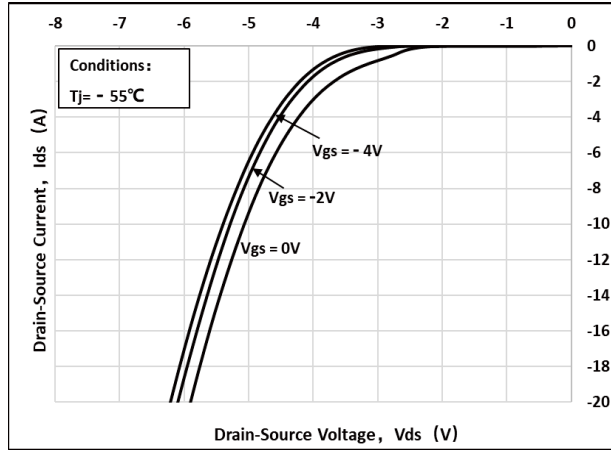


Fig 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

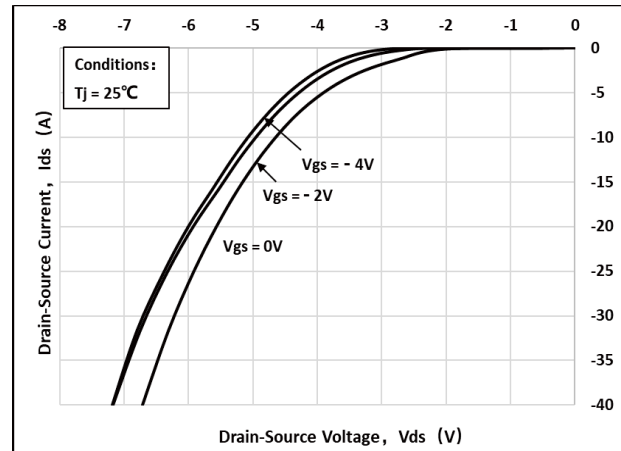


Fig 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

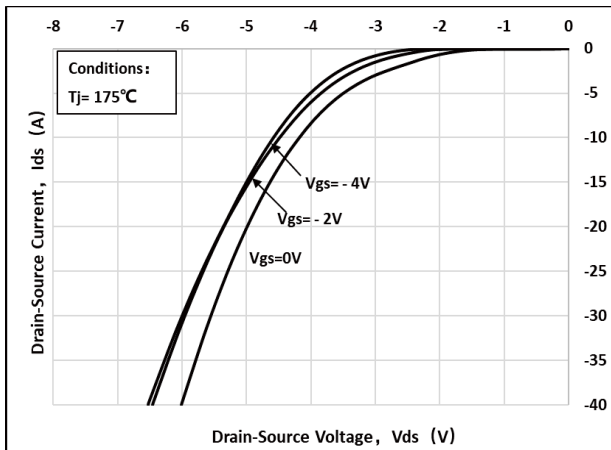


Fig 10: V_{th} Vs T_J Temperature Characteristic

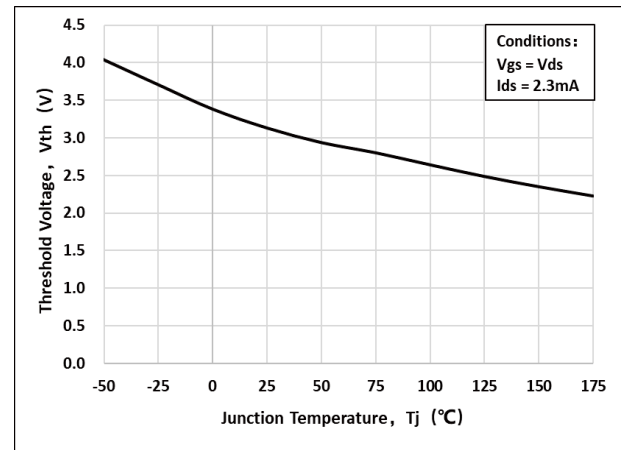


Fig 11: Gate Charge Characteristics

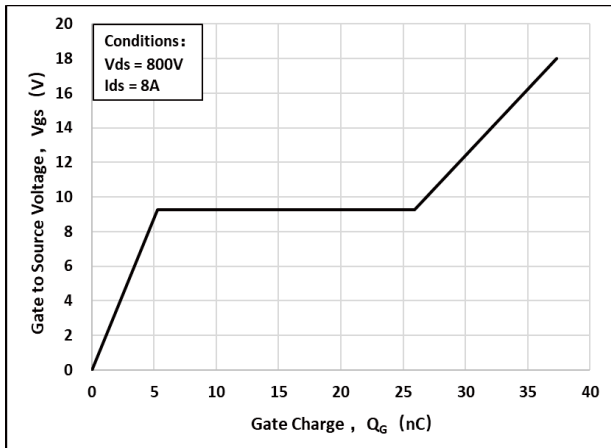


Fig 12: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

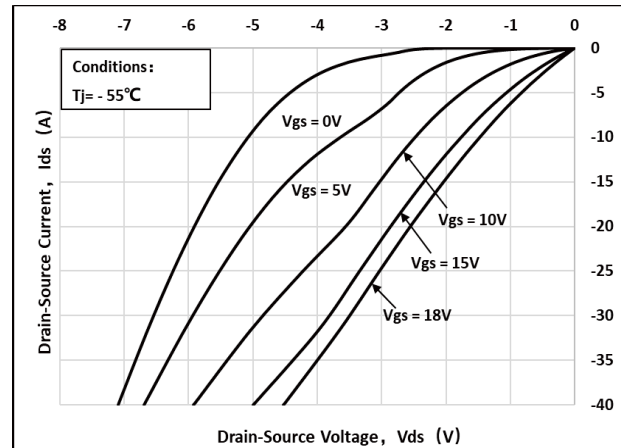




Fig 13: 3rd Quadrant Characteristic($T_J=25^\circ\text{C}$)

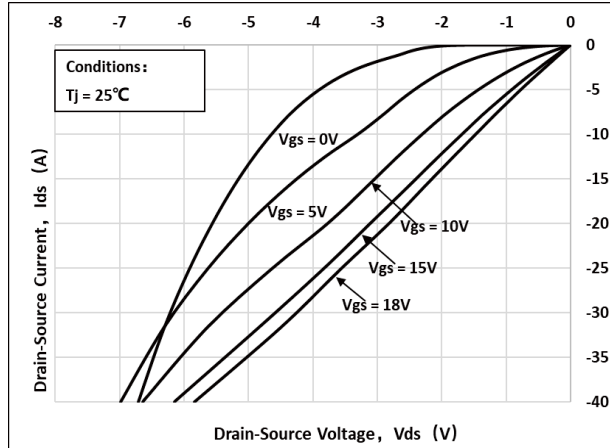


Fig 14: 3rd Quadrant Characteristic($T_J=175^\circ\text{C}$)

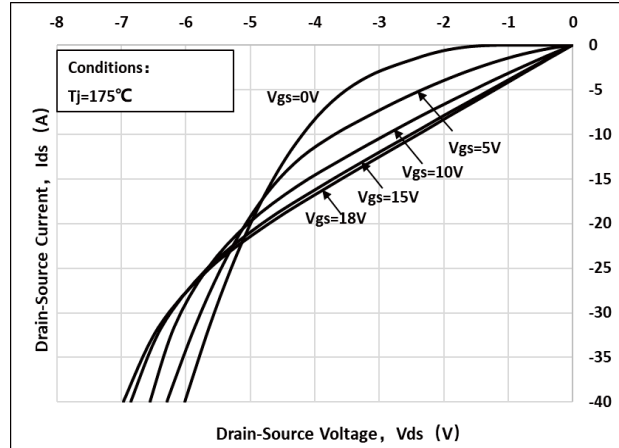


Fig 15: Capacitance Characteristic

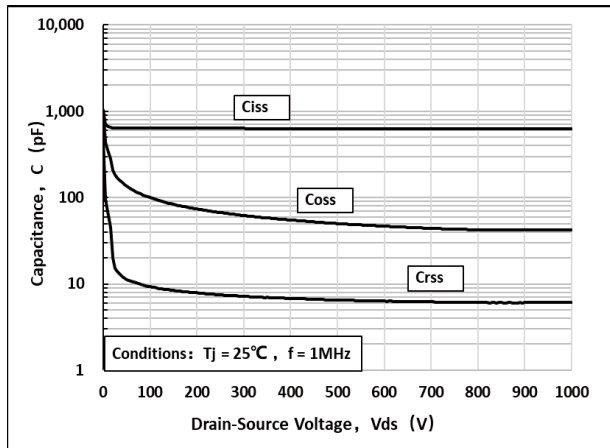


Fig 16: Safe Operating Area

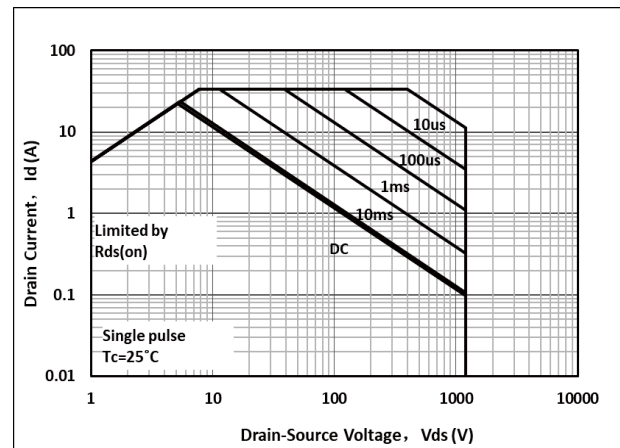
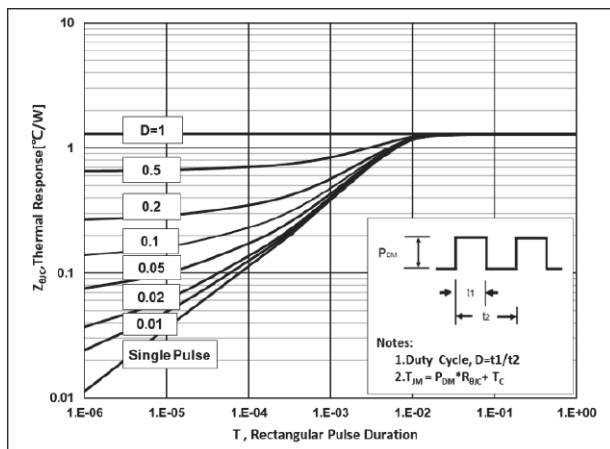


Fig 17: Transient Thermal Impedance





Test Circuit Schematic

Figure A. Definition of switching times

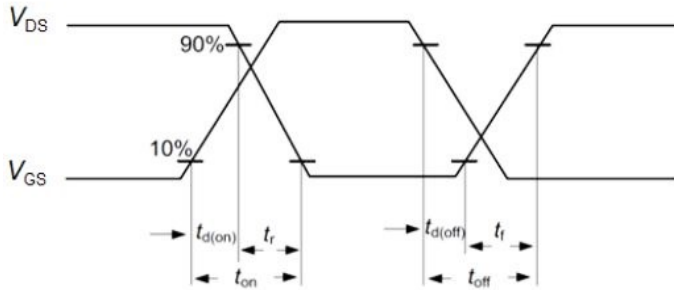


Figure B. Dynamic test circuit

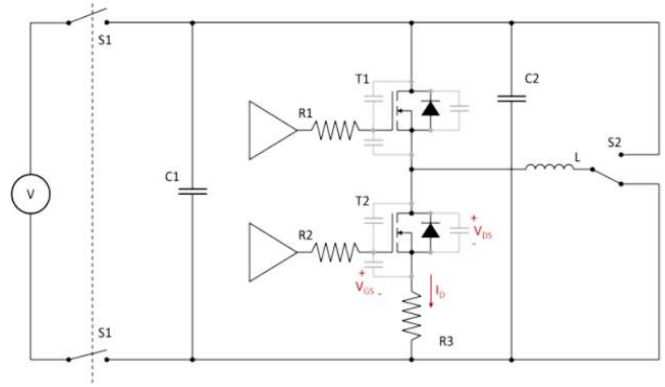


Figure C. Definition of body diodeswitching characteristics

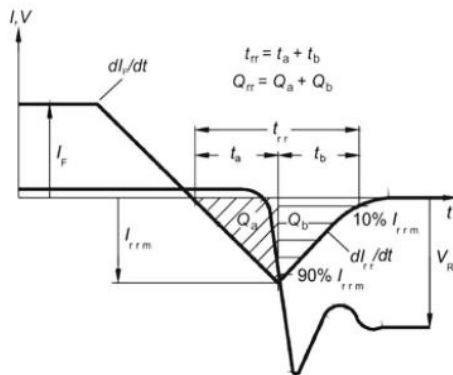
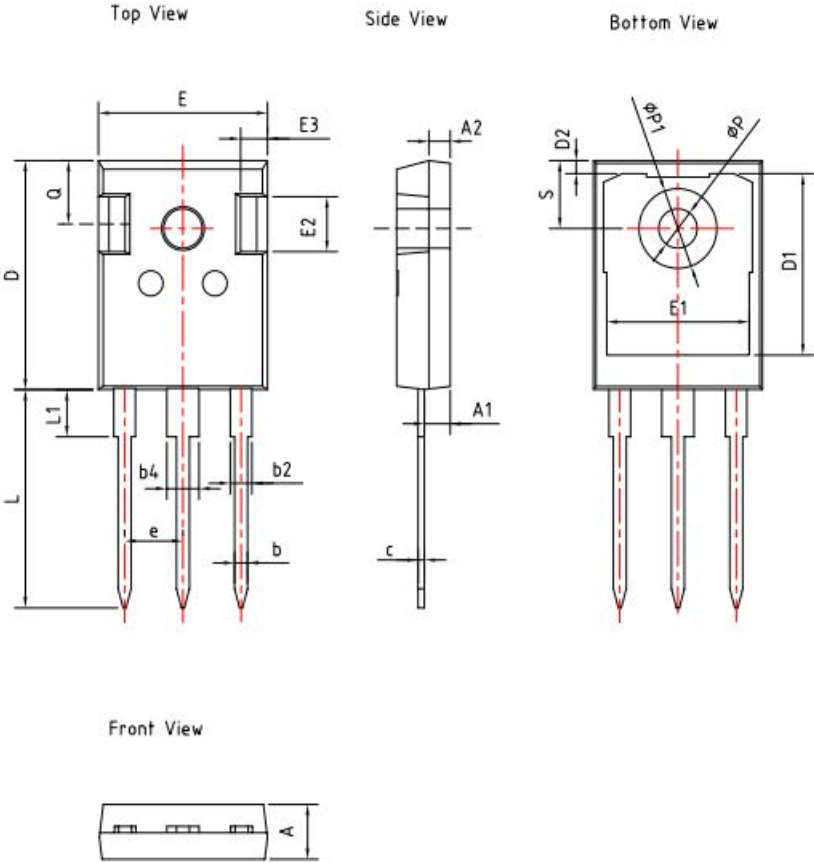


Figure C. Definition of diode switching characteristics



Package Dimensions

Package TO-247



Dimension unit:[mm]			
SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.60	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
D2	1.00	1.20	1.35
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44 BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
φP	3.40	3.60	3.80
φP1	-	-	7.30
Q	5.40	5.80	6.20
S	6.20 BSC		



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