HXYS7N120MP

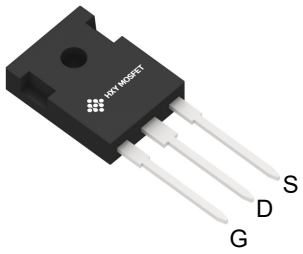
SiC Power MOSFET N-Channel Enhancement Mode

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



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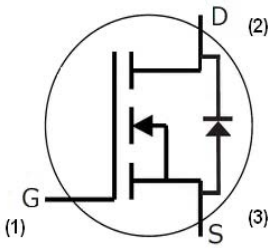
Applications

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



Ordering Part Number	Package	Brand
HXYS7N120MP	TO-247	HXY MOSFET

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， V_{GS} = 18V T_C = 100°C， V_{GS} = 18V	I_D	 7.6 5.5	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	20	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)	Ptot	60	W
Operating junction and storage temperature	Tj , Tstg	-55...+175	°C

●Example of acceptable V_{GS} waveform

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	2.50	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristic (at Tj = 25 °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=1mA
Zero gate voltage drain current	I_{DSS}	-	1	20	μA	V_{DS}=1200V,V_{GS}=0V
		-	5	-		T_C=175°C
Gate-source leakage current	I_{GSS}	-		100	nA	V_{GS}=18V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	-	320	450	mΩ	V_{GS}=18V, I_D=3.6A, T_J=25°C
		-	480	-		TJ=175°C
Transconductance	g_{fs}	-	3	-	S	V_{DS}=20V,I_D=3.6A

Dynamic Characteristic

Input Capacitance	C_{iss}	-	324	-	pF	V_{DS} = 1000V V_{GS} = 0V T_J = 25°C V_{AC} = 25mV f = 1MHz
Output Capacitance	C_{oss}	-		24 -		
Reverse Transfer Capacitance	C_{rss}	-	4	-		
Gate Total Charge	Q_G	-	23.5	-	nC	V_{DS} = 800V V_{GS} = 0/18V I_D = 3.6A I_G = 10mA
Gate-Source charge	Q_{gs}		3.2	-		
Gate-Drain charge	Q_{gd}	-	14	-		
Turn-On Switching Energy	E_{ON}	-	9	-	μJ	V_{DD}=800V， V_{GS}=-4/18V R_G=5Ω, I_D=3.6A Inductive Load,T_J=25°C
Turn-Off Switching Energy	E_{OFF}	-	140	-		
Turn-on delay time	$t_{d(on)}$	-	10.9	-	ns	
Rise time	t_r	-	16.2	-		
Turn-off delay time	$t_{d(off)}$	-	11.2	-		
Fall time	t_f	-	30.4	-		
Gate resistance	R_G	-		5.9 -	Ω	V_{AC} = 25mV, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		3.6		V	V_{GS}= 0V,I_{SD}=4A, T_J=25°C
			3.2			V_{GS}= 0V,I_{SD}=4A, T_J=175°C
Body Diode Reverse Recovery Time	t_{rr}	-	12.3	-	ns	V_R = 800V, V_{GS} = 0V I_D = 3.6A di/dt = 800A/μS T_J = 25°C
Body Diode Reverse Recovery Charge	Q_{rr}	-	23.5	-	nC	

Typical Performance Characteristics

Fig 1. Output Characteristic (T_J=-55°C)

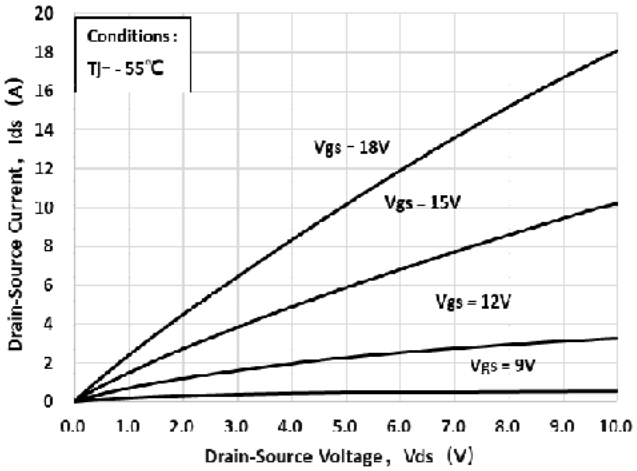


Fig 2. Output Characteristic (T_J=25℃)

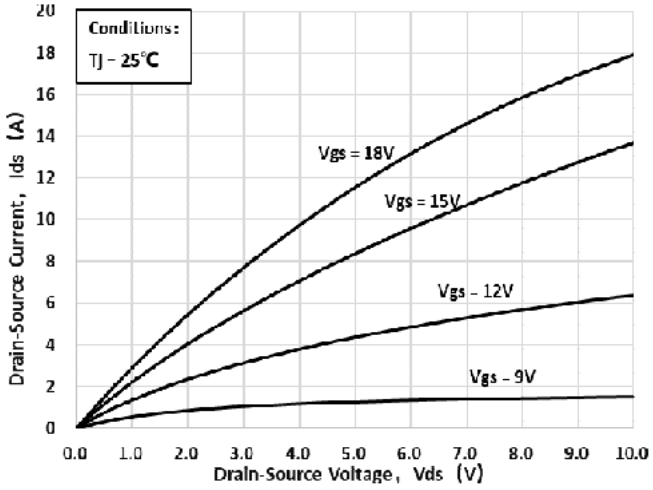


Fig 3. Output Characteristic (T_J=175℃)

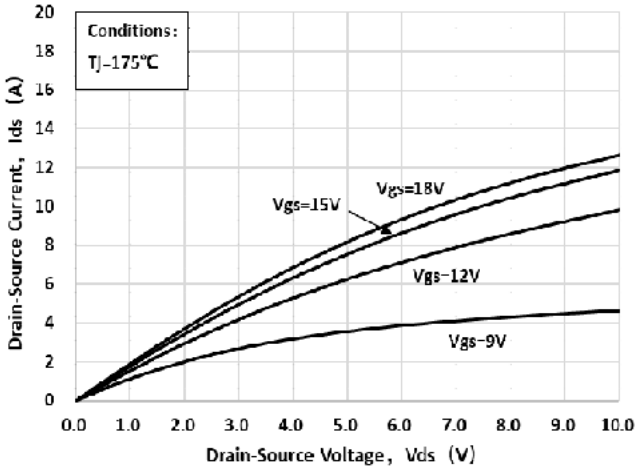


Fig 4: Rdson Vs Ids Characteristic

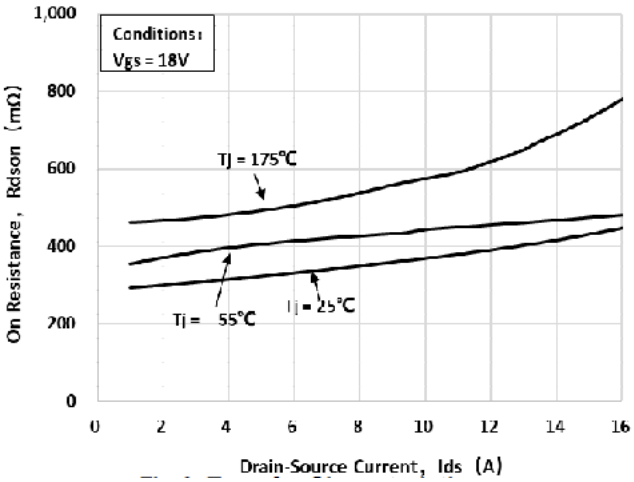


Fig 5: Rds(on) vs. Temperature

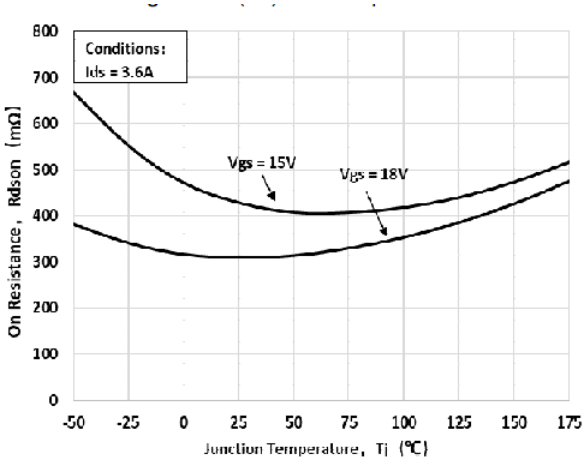


Fig 6: Transfer Characteristic

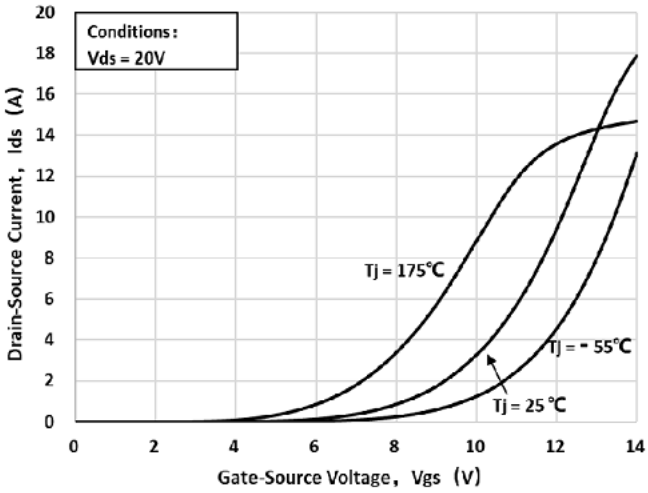


Fig 7: Body-diode Characteristic (T_J=-55℃)

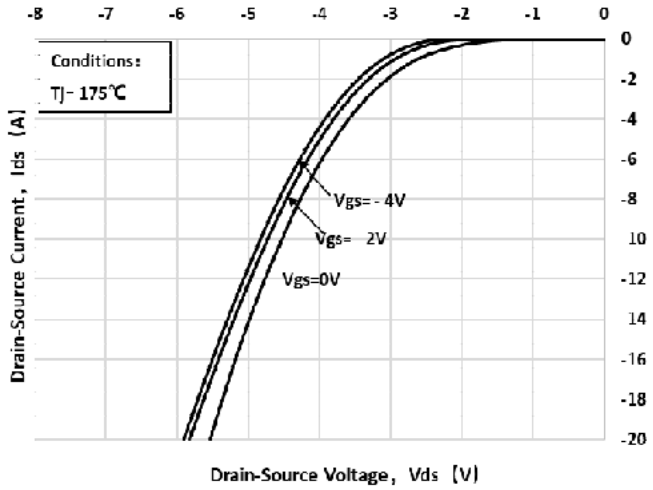


Fig 8: Body-diode Characteristic (T_J=25℃)

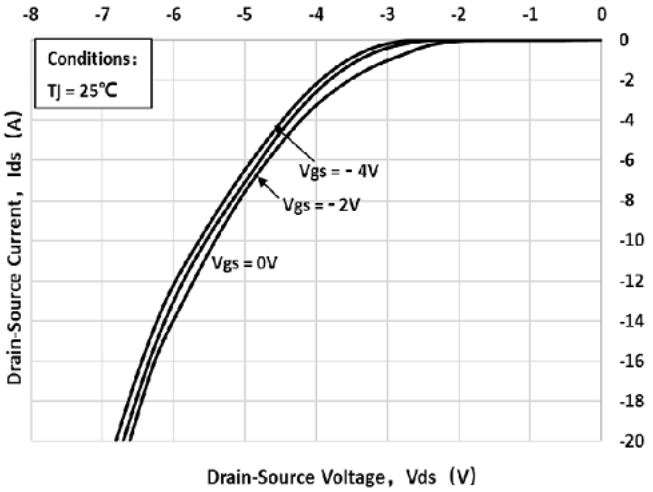
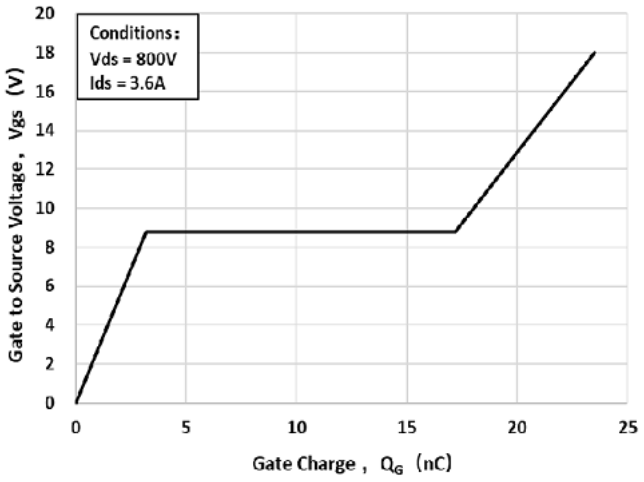


Fig 9: Body-diode Characteristic (T_J=175℃)

Fig 10: V_{TH} Vs T_J Temperature Characteristic



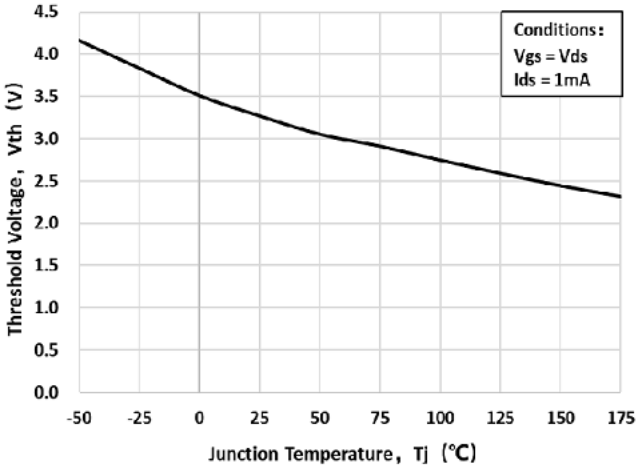
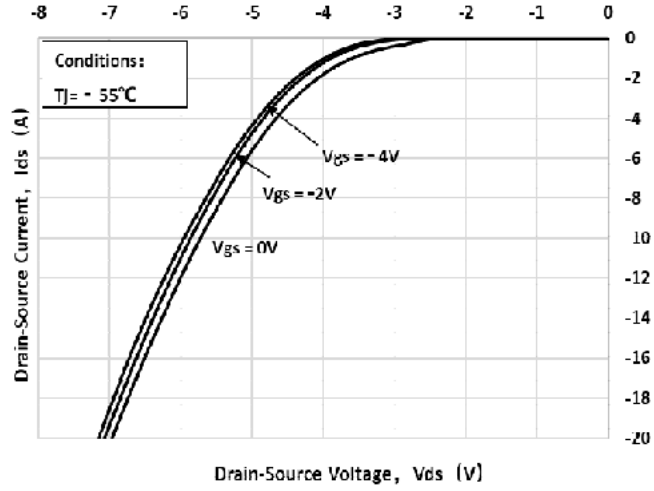


Fig 11: Gate Charge Characteristics

Fig 12: 3rd Quadrant Characteristic(T_J=-55℃)



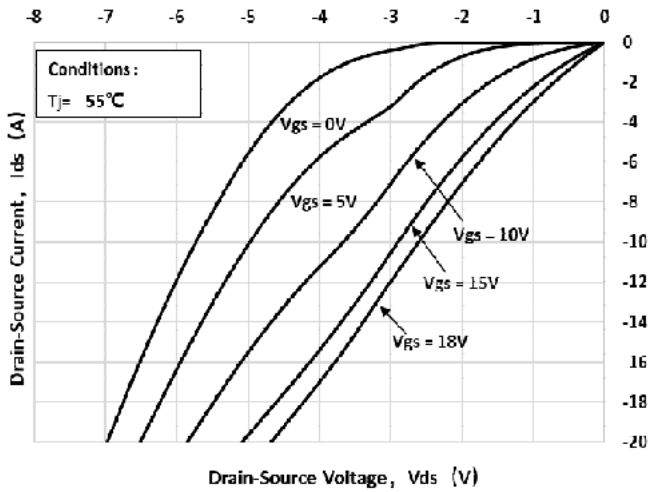


Fig 13: 3rd Quadrant Characteristic(T_J=25℃

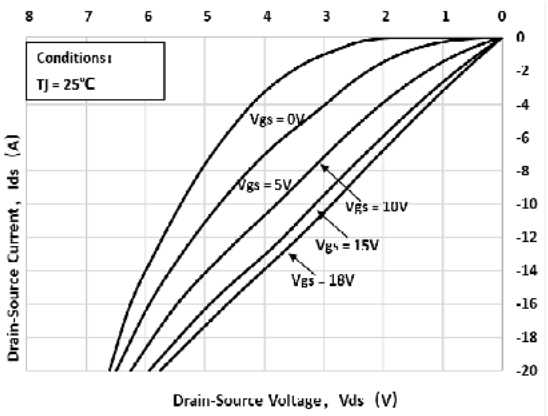


Fig 14: 3rd Quadrant Characteristic(T_J=175℃)

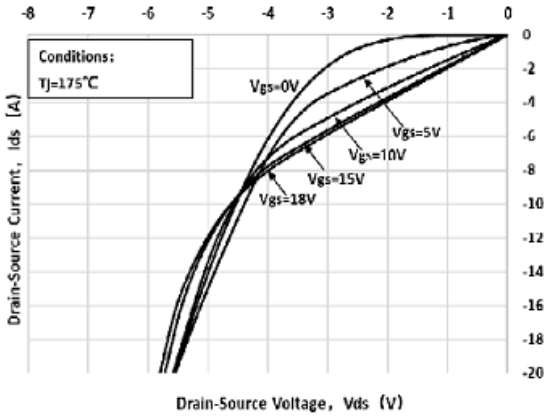


Fig 15: Capacitance Characteristic

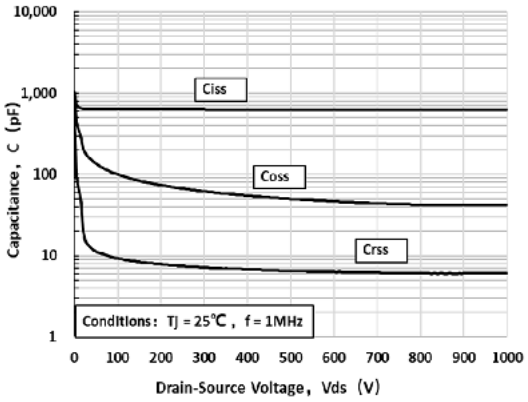


Fig 16: Safe Operating Area

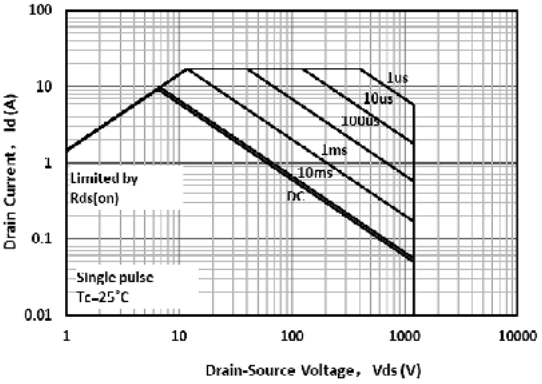
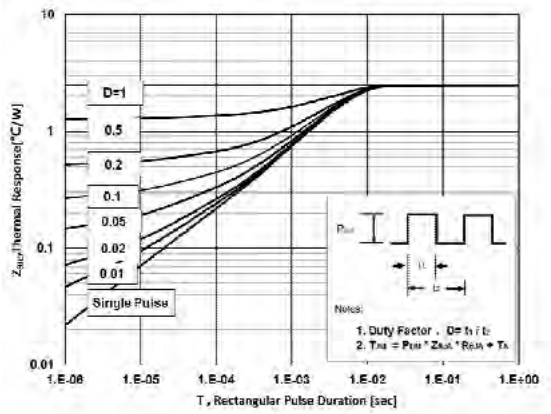


Fig 17: Transient Thermal Impedance



Test Circuit & Waveform

Figure A. Definition of switching times

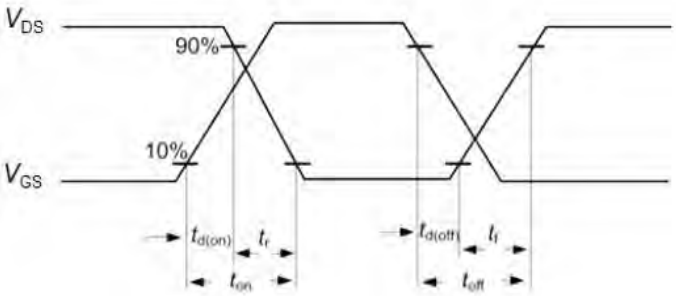


Figure B. Dynamic test circuit

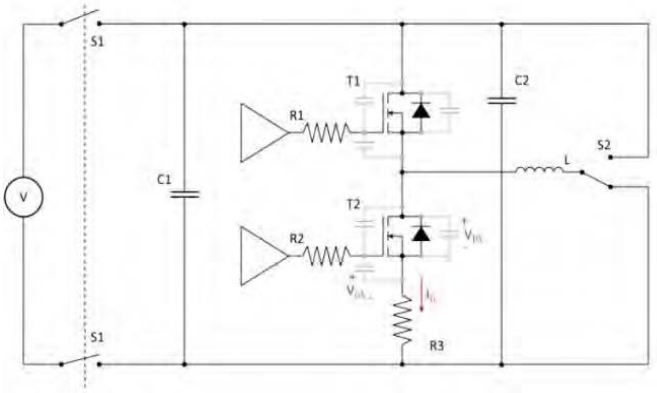


Figure C. Definition of body diodeswitching characteristics

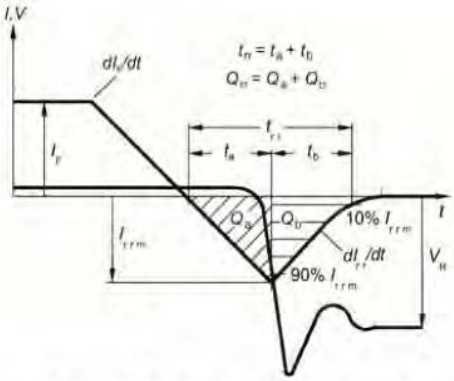
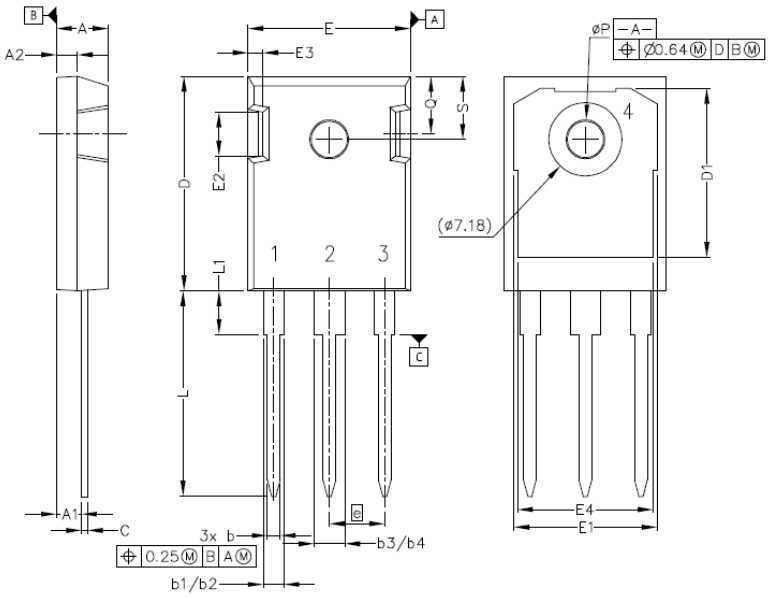
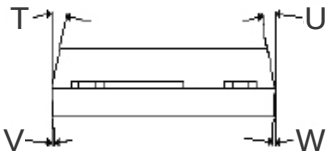


Figure C. **Definition of diode switching characteristics**

Package Dimensions

Package TO-247



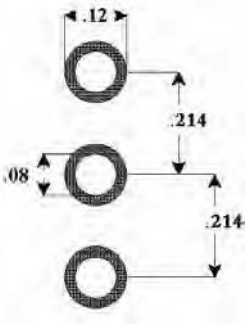


Pinout Information:

- Pin 1 = Gate
- Pin 2, 4 = Drain
- Pin 3 = Source

POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.042	.052	1.07	1.33
b1	.075	.095	1.91	2.41
b2	.075	.085	1.91	2.16
b3	.113	.133	2.87	3.38
b4	.113	.123	2.87	3.13
c	.022	.027	0.55	0.68
D	.819	.831	20.80	21.10
D1	.640	.695	16.25	17.65
D2	.037	.049	0.95	1.25
E	.620	.635	15.75	16.13
E1	.516	.557	13.10	14.15
E2	.145	.201	3.68	5.10
E3	.039	.075	1.00	1.90
E4	.487	.529	12.38	13.43
e	.214 BSC		5.44 BSC	
N	3		3	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	9°	11°	9°	11°
U	9°	11°	9°	11°
V	2°	8°	2°	8°
W	2°	8°	2°	8°

Recommended Solder Pad Layout



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