



Features

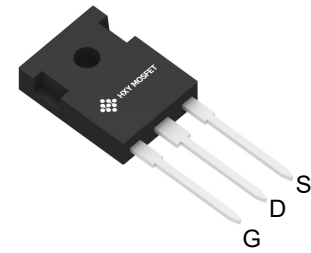
- 3rd generation SiC MOSFET technology
- Optimized package with separate driver source pin
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Q_{rr})
- Halogen free, RoHS compliant

Benefits

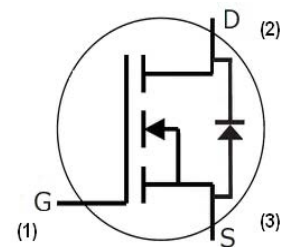
- Reduce switching losses and minimize gate ringing
- Higher system efficiency
- Reduce cooling requirements
- Increase power density
- Increase system switching frequency

Applications

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



TO-247



Ordering Part Number	Package	Qty(PCS)
IMW120R040M1HXKSA1	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 $T_C = 25^\circ\text{C}$, $V_{GS} = 18\text{V}$ $T_C = 100^\circ\text{C}$, $V_{GS} = 18\text{V}$	I_D	87.5 64.2	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D\text{ pulse}}$	140	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}	536 232	W
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	$^\circ\text{C}$
Thermal resistance, junction case. Max	R_{thJC}	0.28	$^\circ\text{C/W}$



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 -	3.14 2.13	5 -	V	V _{DS} =V _{GS} ,I _D =10mA T _C =25°C T _C =175°C
Zero gate voltage drain current	I _{DSS}	- -	0.08 11.09	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)}	- -	39 58	60 -	mΩ	V _{GS} =18V, I _D =35A, T _J =25°C T _J =175°C
Transconductance	g _{fs}	- -	13.2 13.9	- -	S	I _{DS} =30A T _C =25°C T _C =175°C
Input Capacitance	C _{iss}	-	3726	-	pF	V _{DS} = 800V V _{GS} = 0V V _{AC} = 25mV f = 1MHz
Output Capacitance	C _{oss}	-	214	-		
Reverse Transfer Capacitance	C _{rss}	-	19	-		
Gate Total Charge	Q _G	-	227	-	nC	V _{DS} = 800V V _{GS} = -3/18V I _D = 30A
Gate-Source charge	Q _{gs}	-	40	-		
Gate-Drain charge	Q _{gd}	-	80	-		
Turn-On Switching Energy	E _{ON}	-	644.7	-	μJ	V _{DD} = 800V V _{GS} = -5/+18V I _D = 30A R _G = 4.7Ω L = 100uH
Turn-Off Switching Energy	E _{OFF}	-	191.2	-		
Turn-on delay time	t _{d(on)}	-	26.5	-	ns	
Rise time	t _r	-	42.2	-		
Turn-off delay time	t _{d(off)}	-	43.7	-		
Fall time	t _f	-	13.7	-		
Gate resistance	R _G	-	1.35	-	Ω	V _{AC} = 25mV, f=1MHz



Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}		3.57		V	$V_{GS}=0V, I_{SD}=20A, T_J=25^{\circ}C$
			3.27			$V_{GS}=0V, I_{SD}=15A, T_J=175^{\circ}C$
Continuous Source Current	I_{SD}	-	-	80	ns	$V_{GS}=-3V, T_J=25^{\circ}C$
		-	-	46		$V_{GS}=-3V, T_J=100^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	24.2	-	ns	$V_R = 800V$ $I_D = 30A$ $di/dt = 1000A/\mu S$ $T_J = 25^{\circ}C$
Body Diode Reverse Recovery Charge	Q_{rr}	-	144	-	nC	

Typical Performance Characteristics

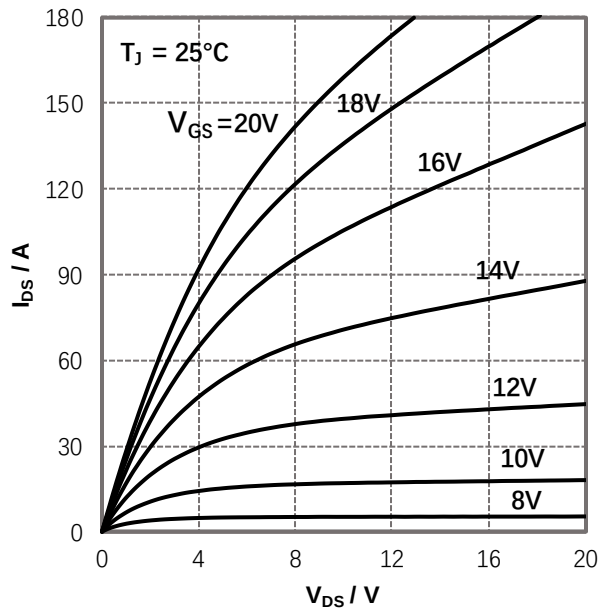


Fig 1. Output Characteristics ($T_J = 25^{\circ}C$)

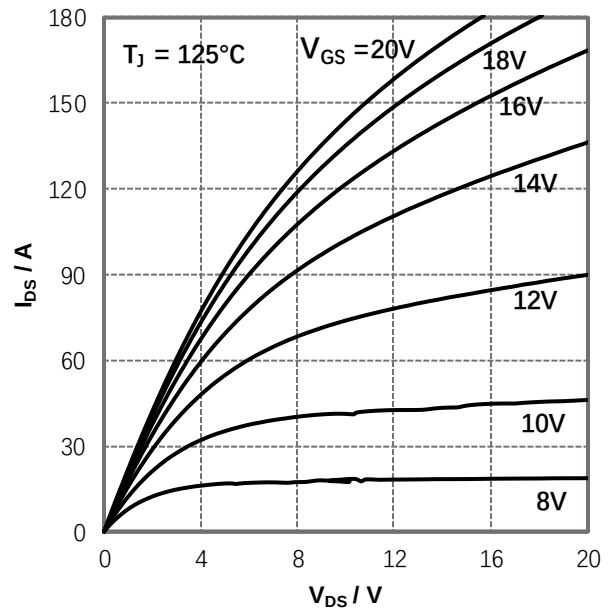


Fig 2. Output Characteristics ($T_J = 125^{\circ}C$)

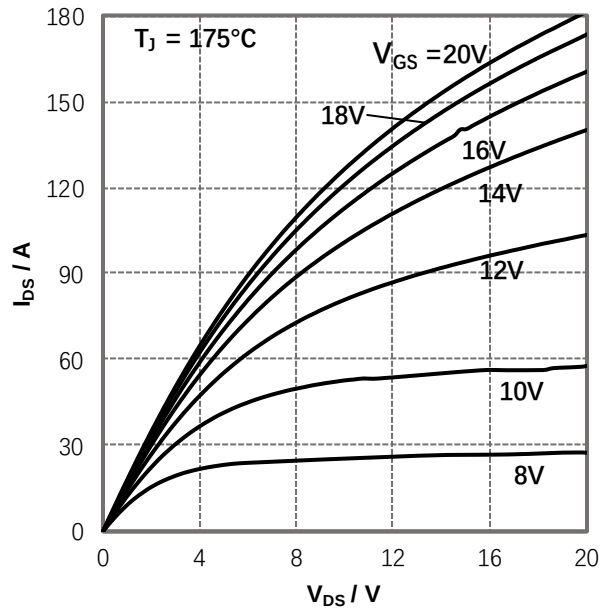


Fig 3. Output Characteristics ($T_j = 175^\circ\text{C}$)

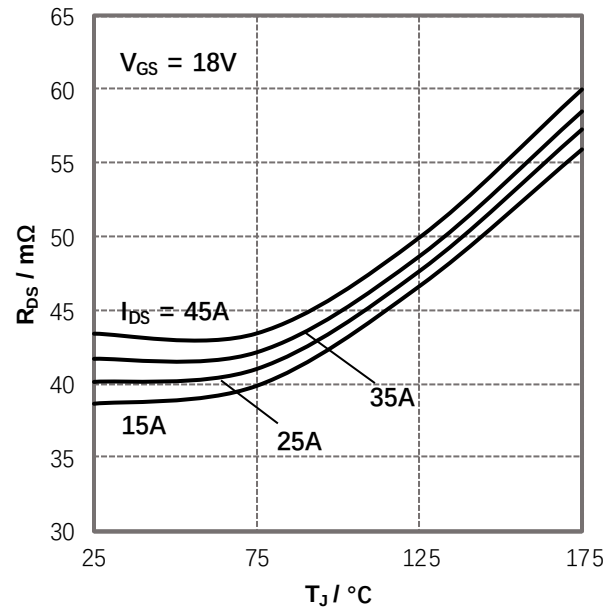


Fig 4: $R_{DS(on)}$ vs. Temperature

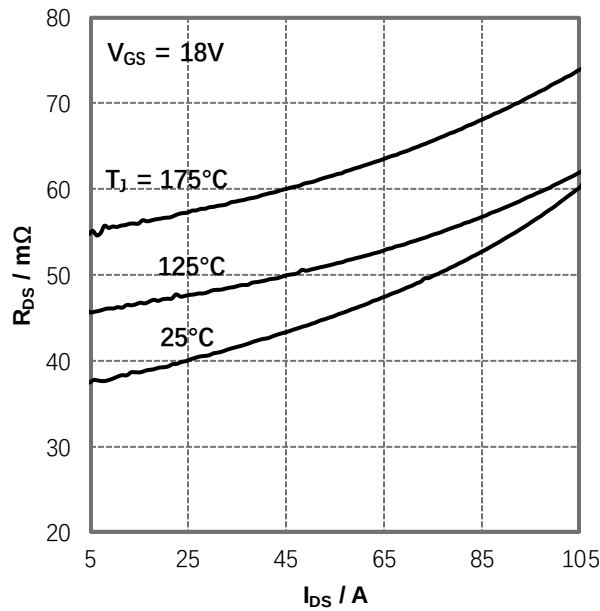


Fig 5. $R_{DS(on)}$ Vs I_{DS} Characteristics

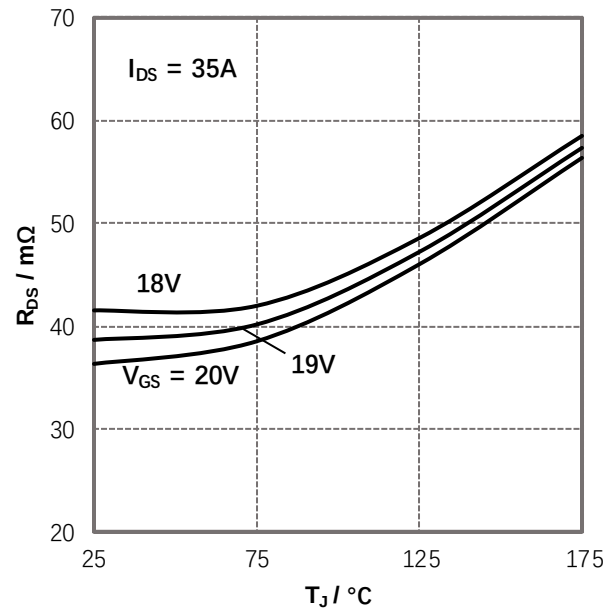
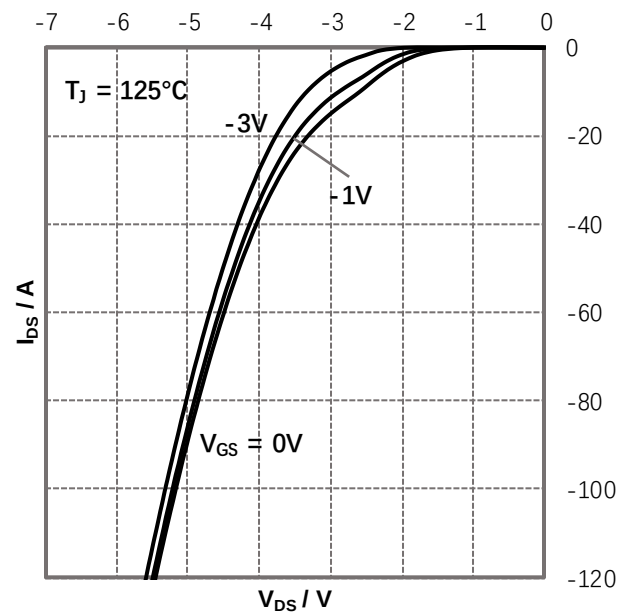
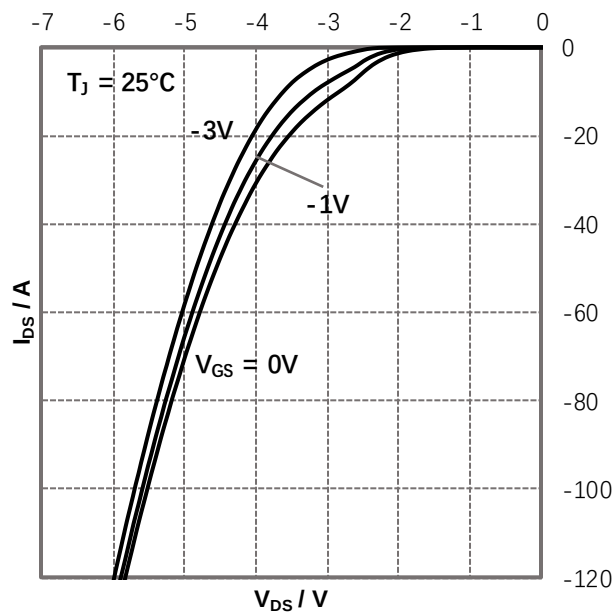
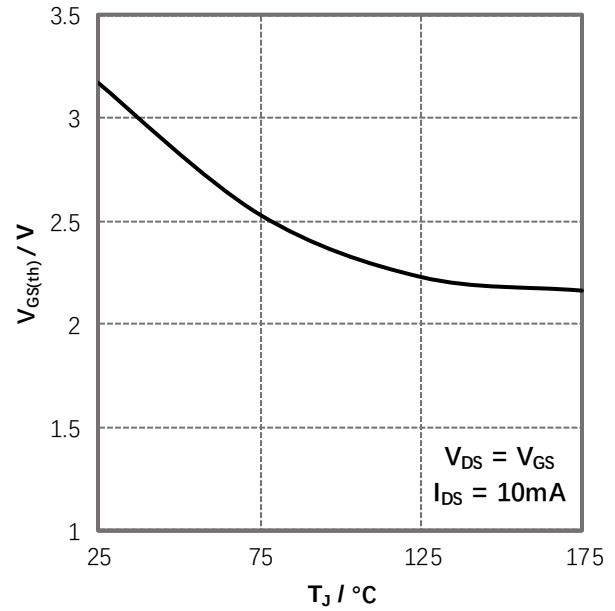
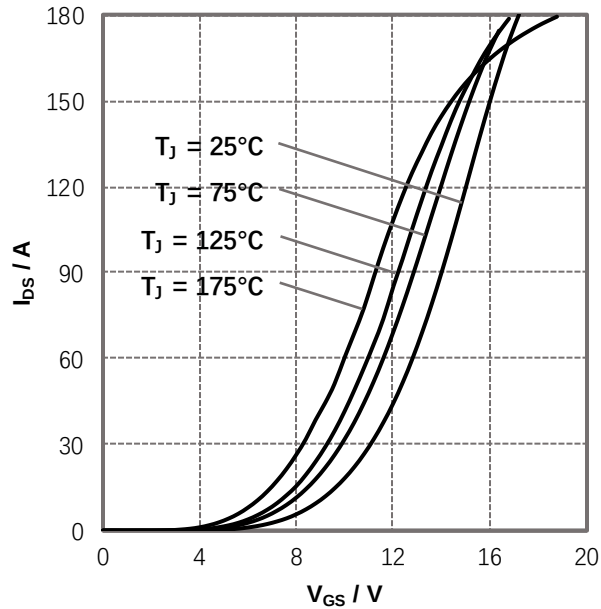


Fig 6. Normalized On-Resistance vs. Temperature



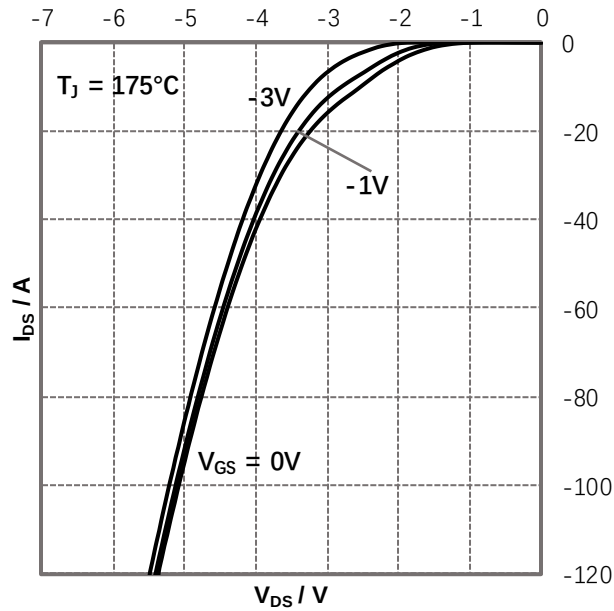


Fig 11. Body-diode Characteristics ($T_j = -175^\circ\text{C}$)

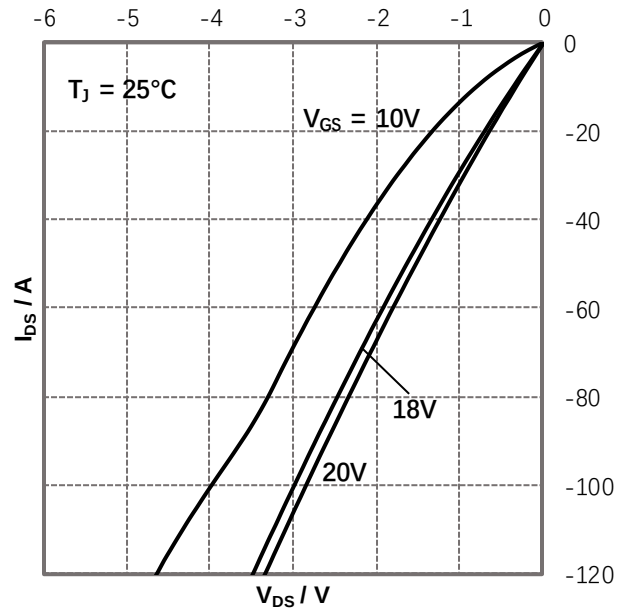


Fig 12. 3rd Quadrant Characteristics ($T_j = -25^\circ\text{C}$)

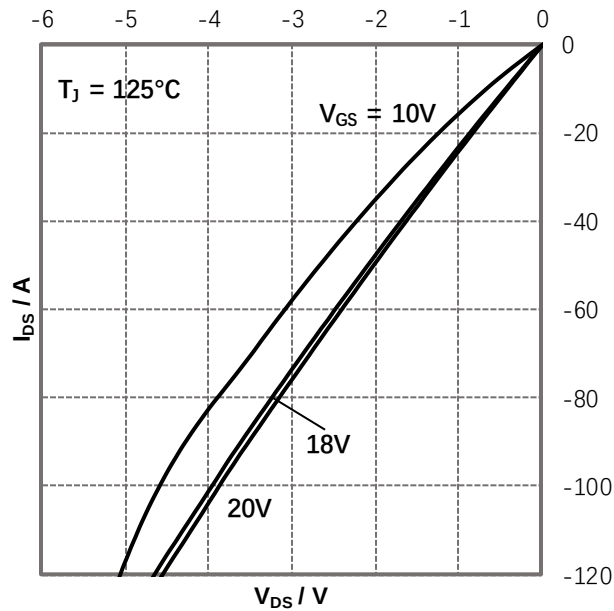


Fig 13. 3rd Quadrant Characteristics ($T_j = -125^\circ\text{C}$)

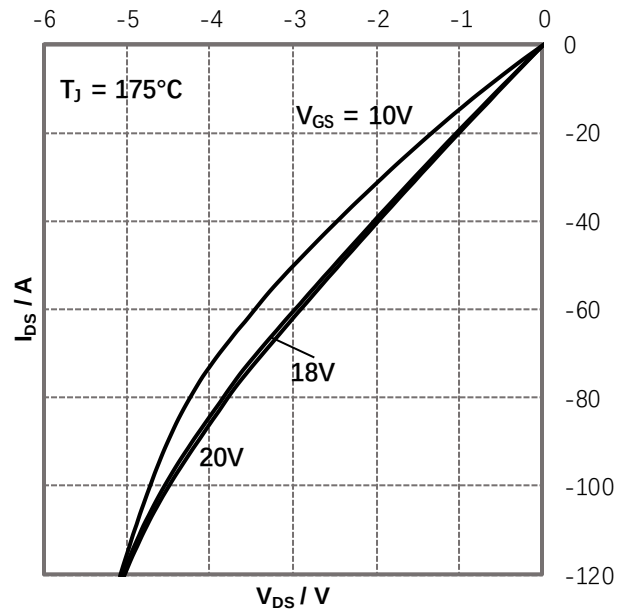
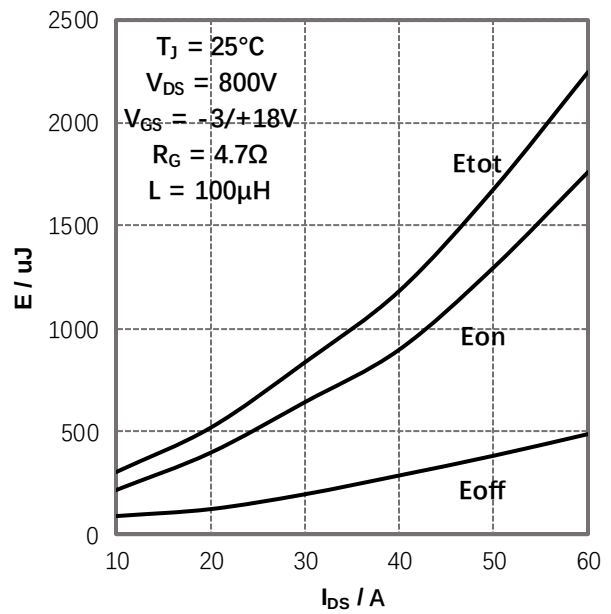
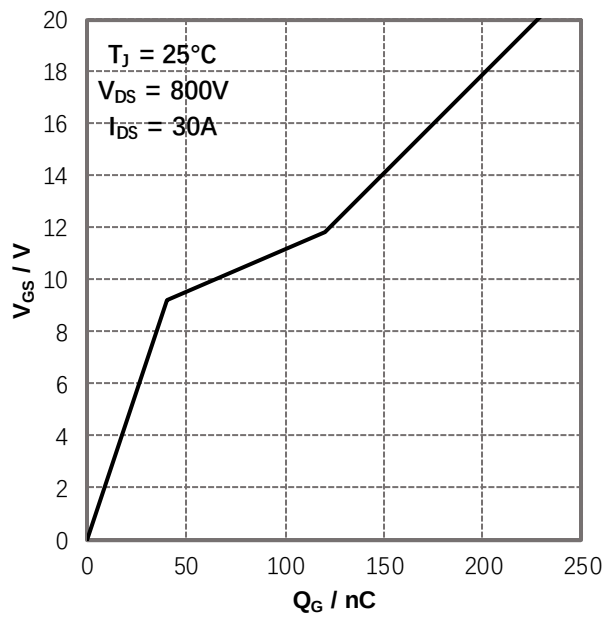
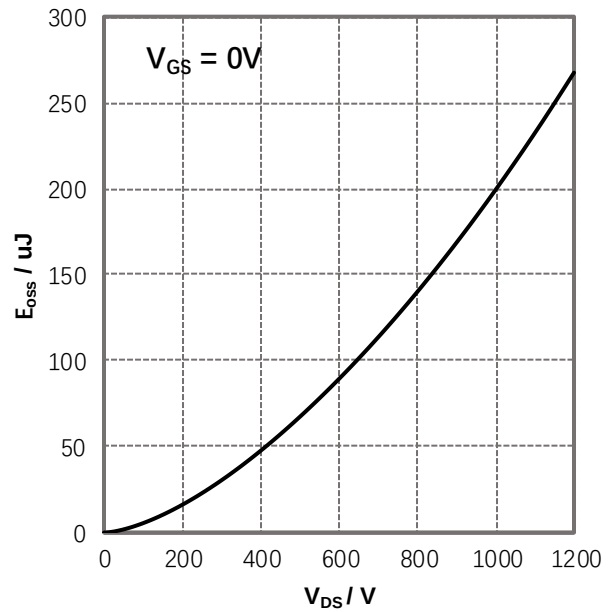
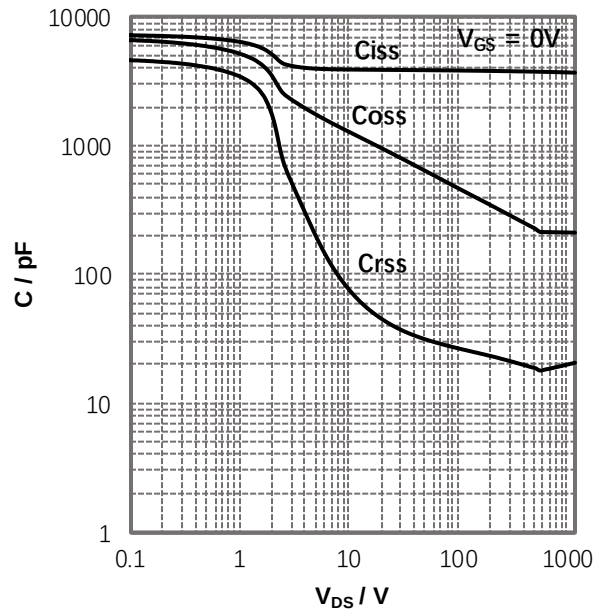


Fig 14. 3rd Quadrant Characteristics ($T_j = -175^\circ\text{C}$)



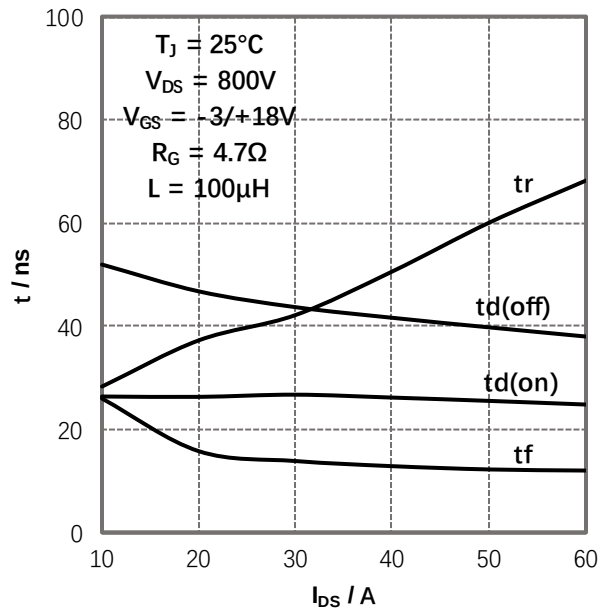


Fig 19. Switching Times vs. I_{DS}

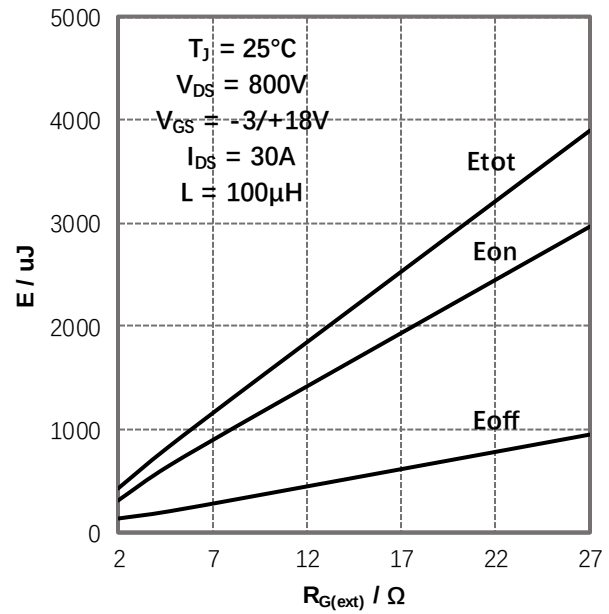


Fig 20. Clamped Inductive Switching Energy vs. Temperature

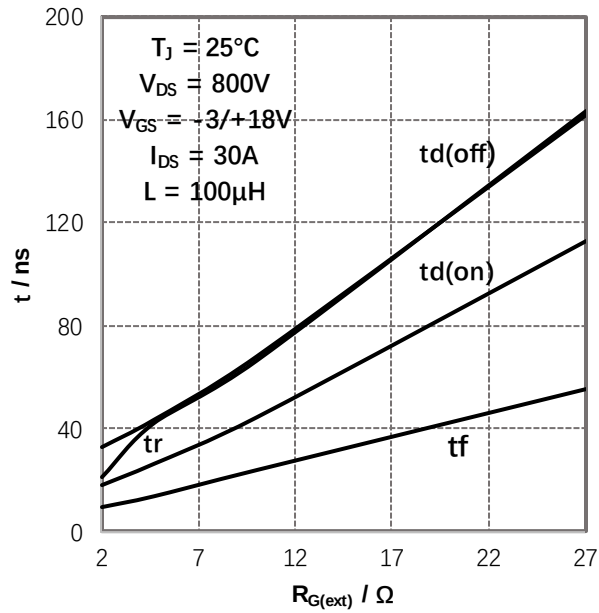


Fig 21. Switching Times vs. R_{G(ext)}

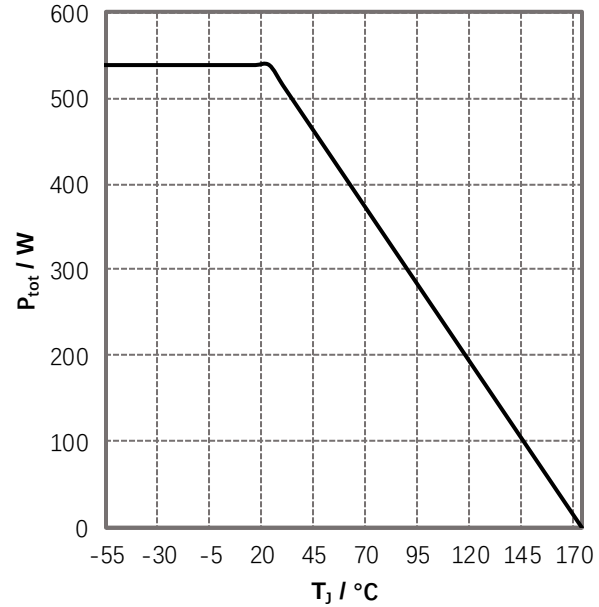


Fig 22. Maximum Power Dissipation Derating vs. Case Temperature

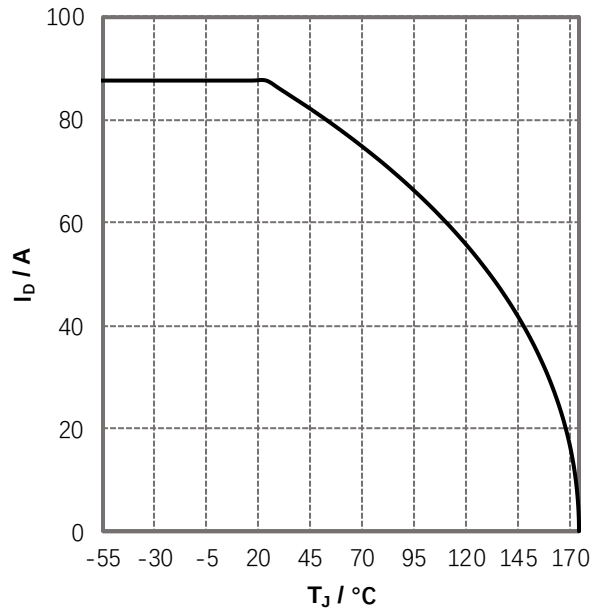


Fig 23. Continuous Drain Current Derating vs. Case Temperature

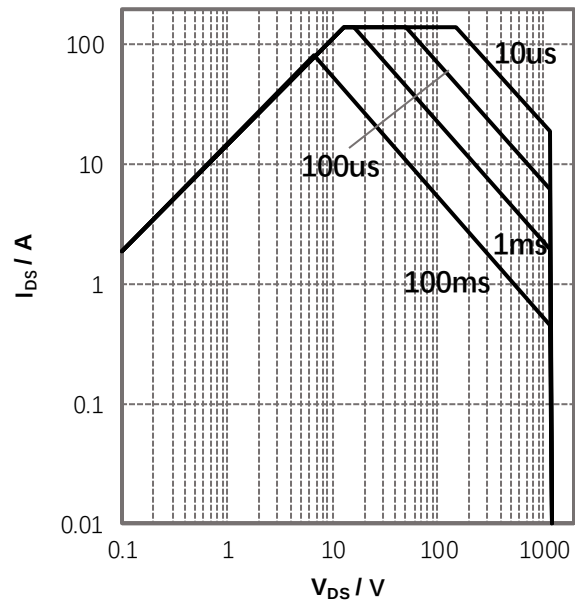


Fig 24. Safe Operating Area

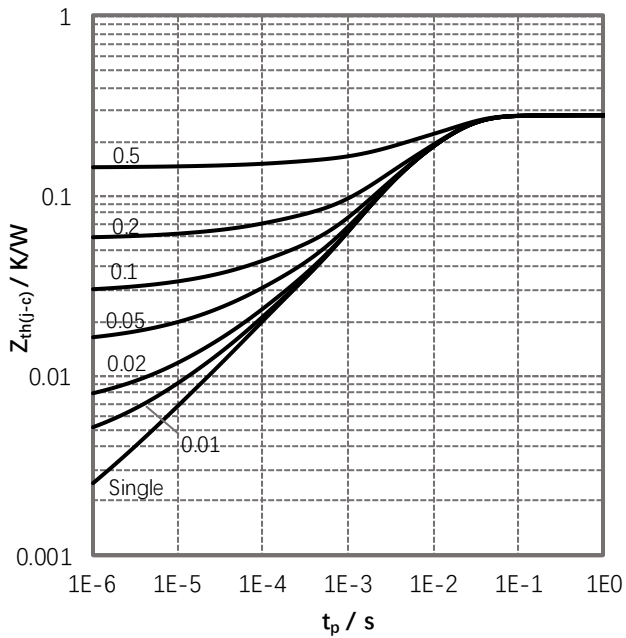
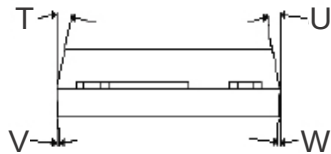
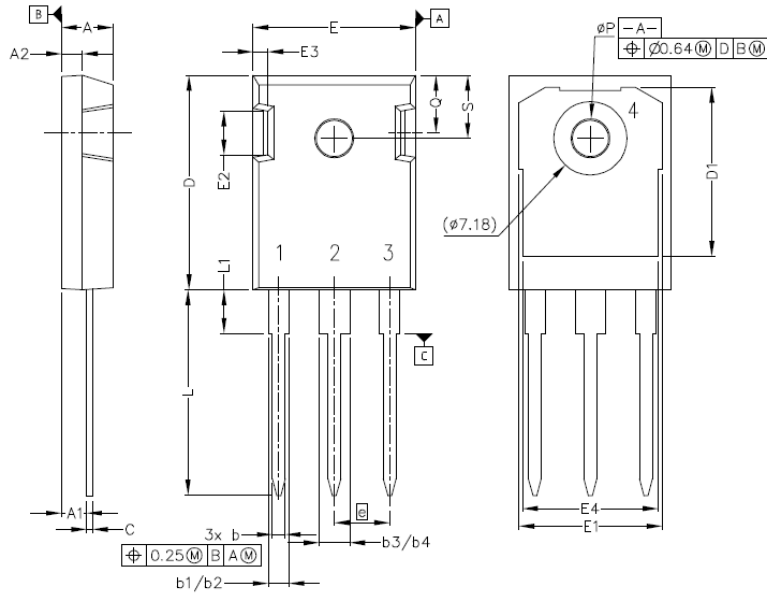


Fig 25. Transient Thermal Impedance



Package Dimensions

Package TO-247

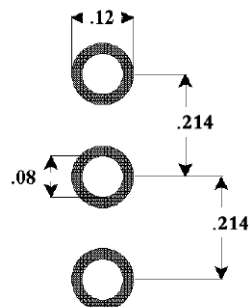


Pinout Information:

- 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



TO247-3L



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