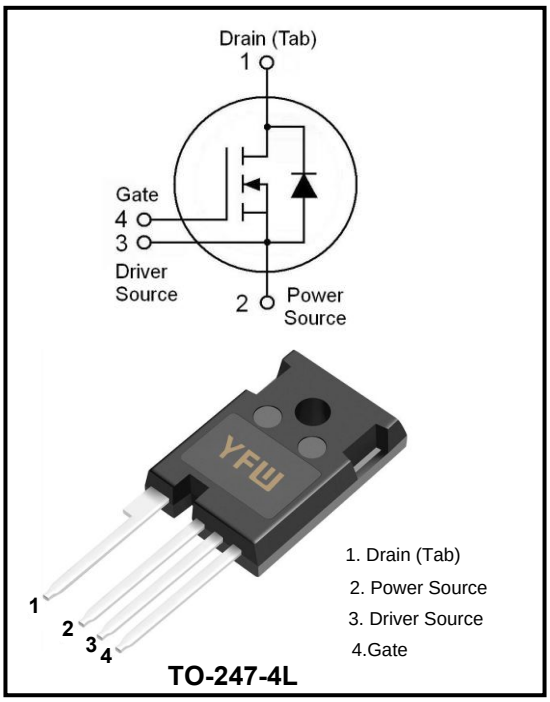
650V Silicon Carbide (SiC) MOSFET

MAIN CHARACTERISTICS

I_D	70A
V_{DSS}	650V
R_{DSON}-typ(@V_{GS}=15V)	＜41mΩ(Typ:30mΩ)



FEATURES

- 3rd generation SiC MOSFET technology
- Optimized package with separate driver source pin
- 8mm of creepage distance between drain and source
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast intrinsic diode with low reverse recovery (Qrr)

APPLICATIONS

- Motor Drives
- EV Charging Station
- High Voltage DC/DC Converters

Absolute Maximum Ratings (T_C = 25℃, unless otherwise specified)

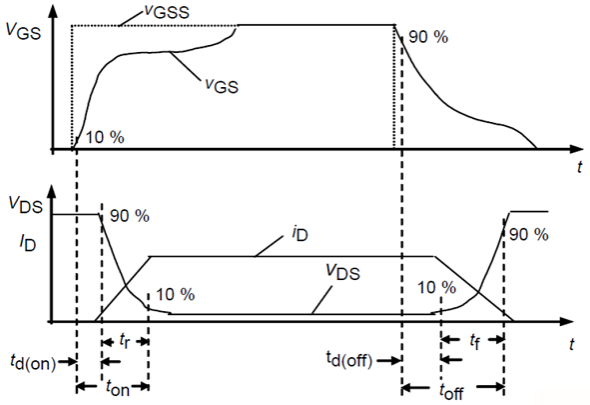
Characteristics			Symbols	Value	Units
Drain-Source Voltage			V_{DS}	650	V
Gate-source Voltage (dynamic)	AC (f >1Hz)	Max	V_{GS}	-8/ +19	V
Gate source voltage (static)			V_{GSop}	-4 / +15	V
Continue Drain Current	V_{GS}=0, T_C=25 ℃ V_{GS}=15V, T_C=100 ℃		I_D	70 49	A
Gate source voltage (static)		pulse	I_D	217	A
Avalanche Capability V_{DD}=100V,V_{GS}=15V,L= 1mH			E_{AS}	450	mJ
Avalanche Peak Current V_{DD}=100V,V_{GS}=15V,L= 1mH			I_{AV}	30	A
Power Dissipation	T_C=25 ℃		P_D	246	W
Operating Temperature Range			T_J	175	°C
Storage Temperature Range			T_{STG}	-40 to +175	°C
Solder Temperature 1.6mm from case for 10s			T_L	260	°C
Mounting Torque (M3 or 6-32 screw)			M_d	1 8.8	Nm Lbf-in
Thermal Resistance, Junction to Case			$R_{\theta JC}$	0.61	°C/W
Thermal Resistance, Junction to Ambient			$R_{\theta JA}$	40	°C/W

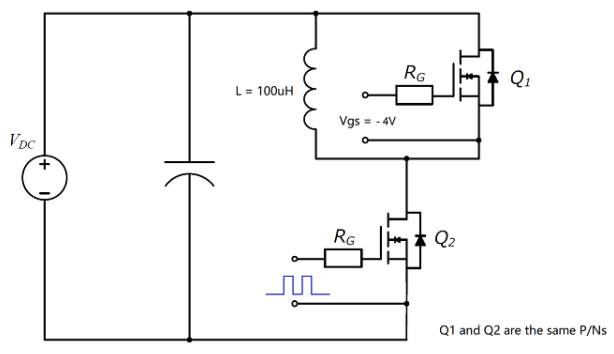
Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.
Absolute maximum ratings are stress ratings only and functional device operation is not implied.

Electrical Characteristics at Tc=25°C unless otherwise specified

Characteristics	Test Condition		Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=100uA		BV_{DSS}	650	-	-	V
Drain-Source Leakage Current	V_{DS} =650 V, V_{GS} = 0 V		I_{DSS}	-	1	50	μA
Gate Source Leakage current	V_{GS} = 15V, V_{DS} = 0V		I_{GSS}		1	200	nA
	V_{GS} = -4V, V_{DS} = 0V		I_{GSS}		-1	-200	nA
Gate-Source Threshold Voltage	V_{DS}=V_{GS}, I_D=10mA	Tj = 25℃	$V_{GS(th)}$	1.8	-	3.6	V
		Tj = 150℃		-	2.0	-	
		Tj = 175℃		-	1.9	-	
Drain-source on-state resistance	V_{GS}=15V I_D=30A	Tj = 25℃	$R_{DS(ON)}$	-	30	41	mΩ
		Tj = 150℃		-	37	-	mΩ
		Tj = 175℃		-	41	-	mΩ
Forward Transconductance	V_{DS} = 20V, I_D=30A		gfs	-	23	-	S
Input Capacitance	V_{DS} = 400V V_{GS} = 0V f = 1MHz		C_{iss}	-	2550	-	pF
Output Capacitance			C_{oss}	-	215	-	
Reverse Transfer Capacitance			C_{rss}	-	6	-	
Coss stored energy			E_{oss}	-	21	-	μJ
Turn-on switching energy	V_{DS} = 400V I_D = 30A V_{GS} = -4V/ 15V $R_{G(ext)}$ = 2Ω L=200μH		E_{on}	-	110	-	μJ
Turn off switching energy			E_{off}	-	15	-	μJ
Turn-on Delay Time			$t_{d(on)}$	-	14	-	ns
Rise Time			T_r	-	17	-	
Turn-Off Delay Time			$t_{d(OFF)}$	-	27	-	
Fall Time			t_f	-	7	-	
Total Gate Charge	V_{DS} = 400V, I_D =30A V_{GS} = -4V/ 15V		Q_g	-	111	-	nC
Gate to Source Charge			Q_{gs}	-	32	-	
Gate to Source Charge			Q_{gd}	-	41	-	
Diode forward voltage	V_{GS}= -4V, I_{SD} =15A T_j=25 ℃		V_{SD}	-	4.5	-	V
	V_{GS}= -4V, I_{SD} =30A T_j=150 ℃.			-	4.7	-	
Diode forward current	V_{GS} = -4V		I_S	-	-	41	A
Reverse recovery time	V_{GS} = -4V , I_{SD} = 30A, V_R = 400V dI$_F$/dt =3300A/μs		trr	-	15	-	nS
Reverse recovery charge			Qrr	-	198	-	μC
Peak reverse recovery current			Irrm	-	23	-	A

Switching Times Definition and Test Circuit





Typical Characteristics

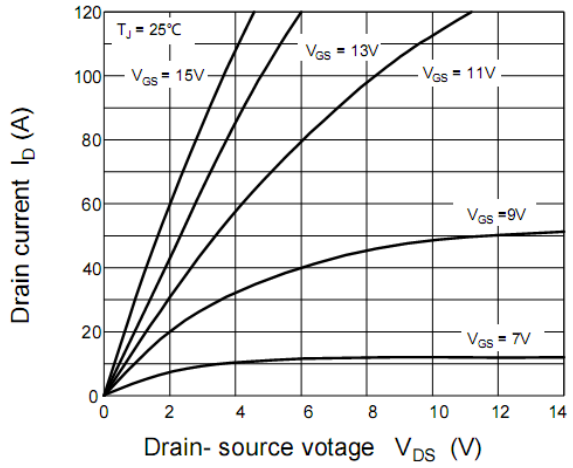


Figure 1. On Region Characteristics

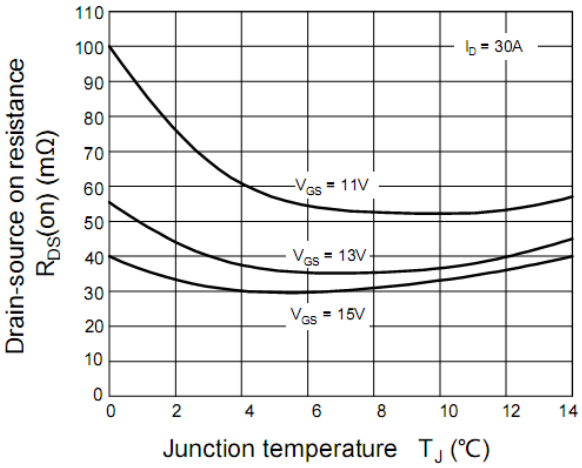


Figure 2. On-Resistance vs. Temperature

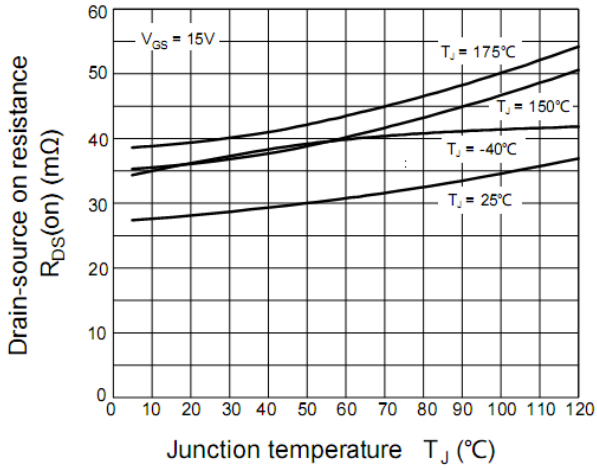


Figure 3. On-Resistance vs. Drain Current For Various Temperature

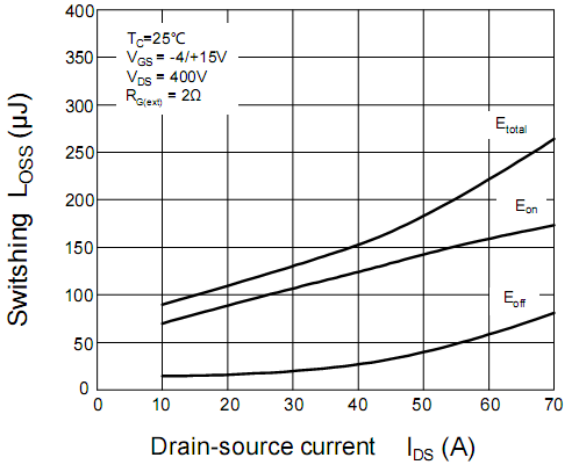


Figure 4. Switching energy vs Drain current

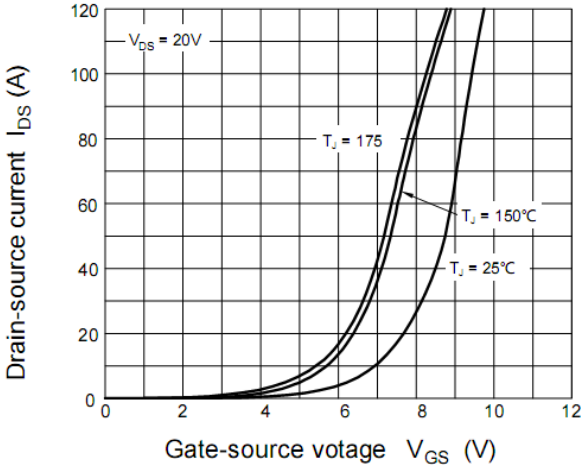


Figure 5. Transfer Characteristic

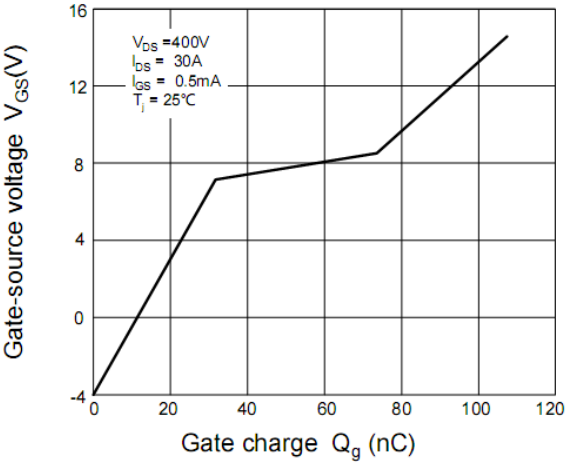


Figure 6. Gate Charge Characteristics

Typical Characteristics

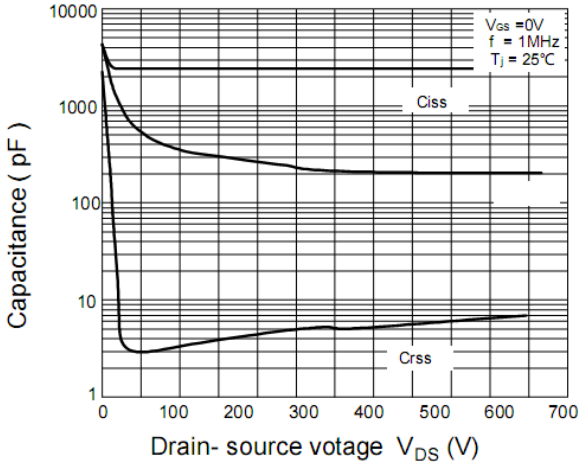


Figure 7. Capacitance vs Drain to Source Voltage

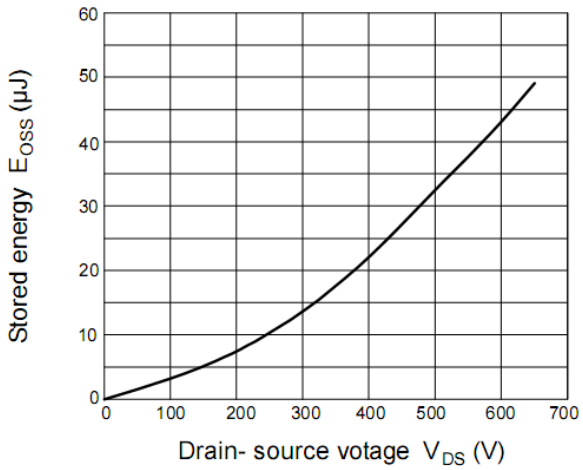


Figure 8. Output Capacitor Stored Energy

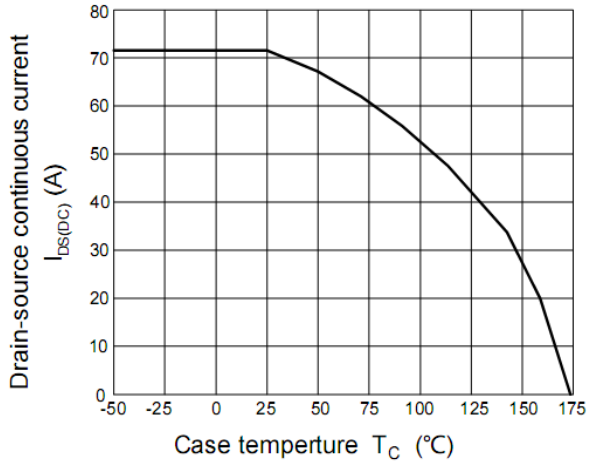


Figure 9. Continuous Drain Current vs Case Temperature

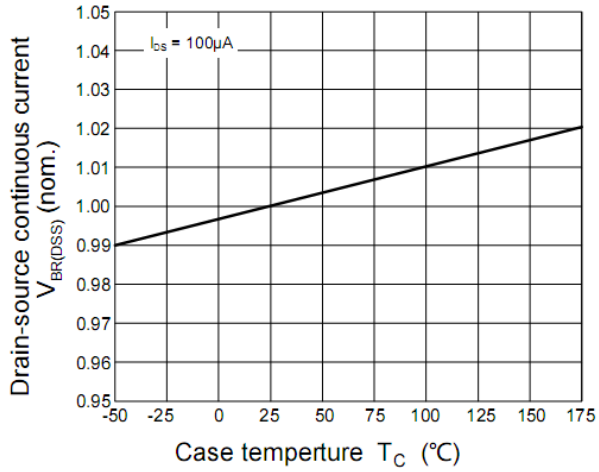


Figure 10. Normalized breakdown voltage vs Temperature

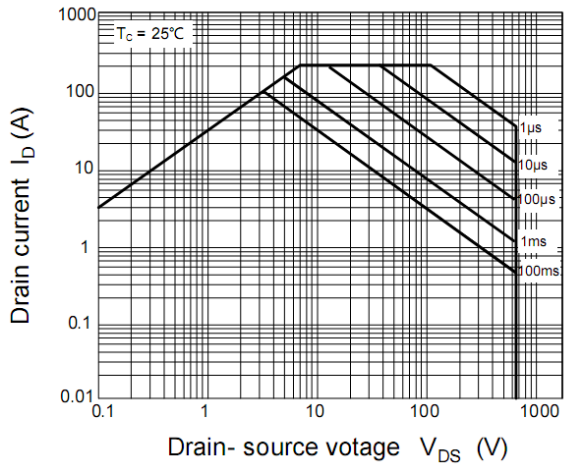


Figure 11. Safe Operating Area

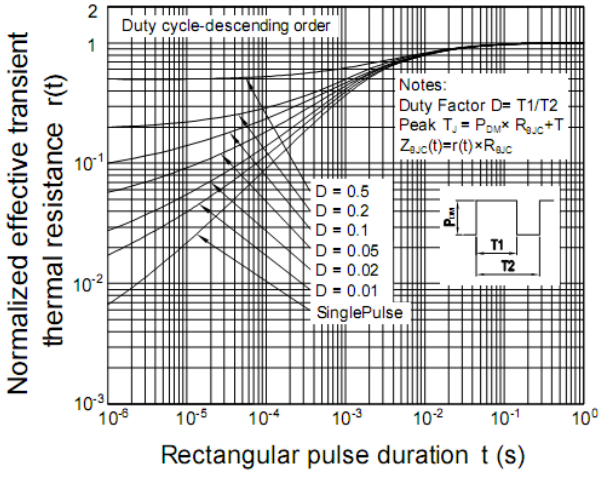
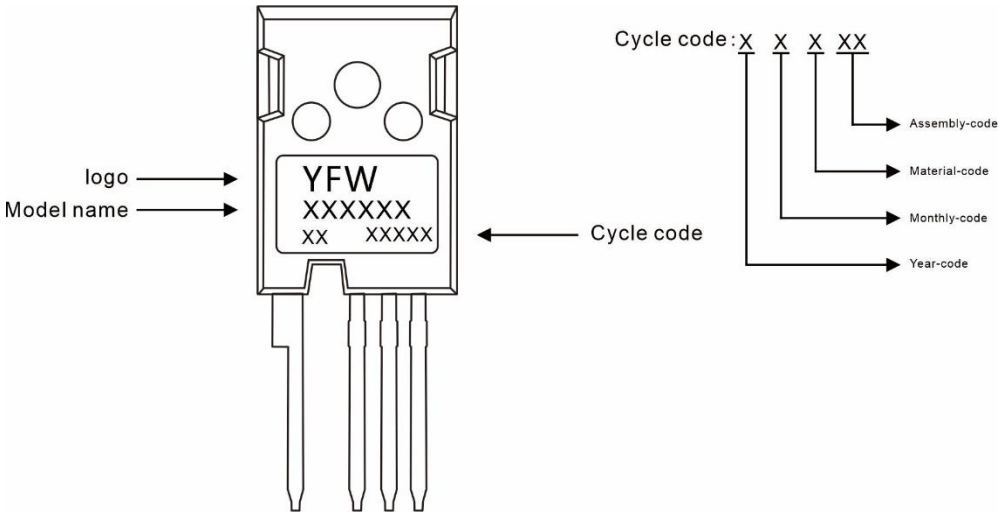


Figure 10. Junction- case Transient Thermal Response Curve

Marking Diagram

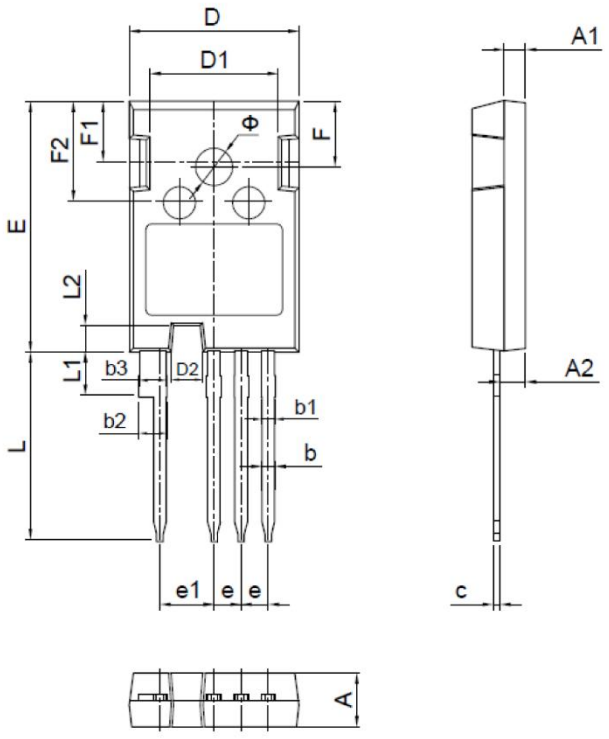


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFWM303065APG3	TO-247-4L	0.242oz(6.85g)	30pcs/tube	600PCS/Box 2400PCS/Carton

Package Dimensions

TO-247-4L



Symbol	Dimensions in mm		Dimensions in Inch	
	Min.	Max.	Min.	Max.
A	4.90	5.10	0.193	0.201
A1	1.90	2.10	0.075	0.083
A2	2.29	2.54	0.090	0.100
b	1.07	1.33	0.042	0.052
b1	1.20	1.50	0.047	0.059
B2	2.40	2.80	0.094	0.110
B3	2.40	2.69	0.094	0.106
c	0.55	0.68	0.022	0.027
D	15.77	16.03	0.621	0.631
D1	11.60	12.00	0.457	0.472
D2	2.40	2.70	0.094	0.106
E	23.30	23.70	0.917	0.933
e	2.54(BSC)		0.100(BSC)	
e1	5.08(BSC)		0.200(BSC)	
F	6.05	6.25	0.238	0.246
F1	5.50	5.90	0.217	0.232
F2	9.30	9.70	0.366	0.382
L	17.20	17.60	0.677	0.693
L1	4.05	4.35	0.159	0.171
L2	2.35	2.65	0.093	0.104
Φ	3.50	3.70	0.138	0.146

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