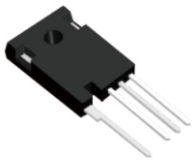
CSMFP4OT040-HF

N-Channel
RoHS Device
Halogen Free



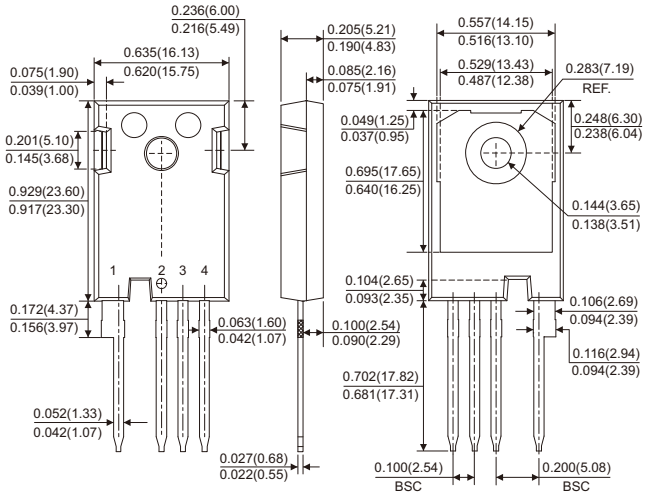
Features

- Low on-resistance and high current density.
- Low capacitance for high frequency operation.
- Positive temperature coefficient device.
- Low impedance kelvin source pin-out.

Mechanical data

- Case: TO-247-4L, molded plastic.
- Terminals: Solderable per MIL-STD-750, method 2026.
- Mounting position: Any.

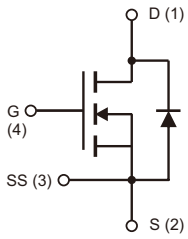
TO-247-4L



Dimensions in inches and (millimeter)

Circuit Diagram

G: Gate
S: Source
D: Drain



Maximum Ratings (at T_A=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-source voltage	V_{GS} = 0V, I_{DS} = 100μA	$V_{DS, max}$	1200	V
Continuous drain current	V_{GS} = 20V, T_C = 25°C	I_D	63	A
	V_{GS} = 20V, T_C = 110°C	I_D	43.5	
Pulse drain current	t_{PW} limitation per Fig.15	$I_{D, pulse}$	227	
Avalanche energy, single pulse	V_{DD} = 100V, I_D = 12A	E_{AS}	1875	mJ
Power dissipation	T_C = 25°C	P_D	341	W
Recommend gate source voltage	Static, recommended DC operating values	$V_{GS, op}$	-5 to 20	V
Maximum gate source voltage	Transient operating limit (AC f > 1Hz, duty cycle < 1%)	$V_{GS, max}$	-10 to 25	
Operating junction and storage temperature range		T_J, T_{STG}	-55 to 175	°C
Soldering temperature		T_L	260	
Mounting torque	M3 or 6-32 screw	M_D	1	Nm

Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Thermal resistance junction to case	$R_{\theta JC}$		0.44		°C/W

Electrical Characteristics (at T_C=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-source breakdown voltage	BV_{DSS}	V_{GS} = 0V, I_{DS} = 100μA	1200			V
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = 10V, I_{DS} = 40mA	1.5	2.7	4.5	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 1200V, V_{GS} = 0V		1	50	μA
		V_{DS} = 1200V, V_{GS} = 0V, T_J = 175°C		10	500	
Gate-source leakage current	I_{GSS}	V_{GS} = 20V, V_{DS} = 0V			250	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS} = 20V, I_{DS} = 30A		40	52	mΩ
		V_{GS} = 20V, I_{DS} = 30A, T_J = 175°C		75		
Transconductance	g_{fs}	V_{DS} = 15V, I_{DS} = 30A		15		S
Input capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 800V, f = 1MHz, V_{AC} = 25mV		3619		pF
Output capacitance	C_{oss}			145		
Reverse transfer capacitance	C_{rss}			18		
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS} = 0V, V_{DS} = 0 to 800V		189		
Effective output capacitance, time related	$C_{o(tr)}$	I_D = const., V_{GS} = 0V, V_{DS} = 0 to 800V		264		
Turn on delay time	$t_{d(on)}$	V_{DS} = 800V, V_{GS} = -4/+20V, I_D = 30A, R_L = 27Ω, $R_{G(ext)}$ = 2.7Ω		26		ns
Rise time	t_r			50		
Turn off delay time	$t_{d(off)}$			7		
Fall time	t_f			11		
Coss stored energy	E_{oss}	V_{GS} = 0V, V_{DS} = 800V, f = 1MHz, V_{AC} = 25mV		60		μJ
Turn-on switching energy	E_{on}	V_{DS} = 800V, V_{GS} = 0/20V, I_D = 40A, L = 350nH, $R_{G(ext)}$ = 2.7Ω		326		
Turn-off switching energy	E_{off}			209		
Internal gate resistance	$R_{G(int.)}$	f = 1MHz, V_{AC} = 25mV		0.9		Ω
Built-in SiC Diode Characteristics						
Inverse diode forward voltage	V_{SD}	V_{GS} = 0V, I_{SD} = 7.5A		2.9		V
Continuous diode forward current	I_S	V_{GS} = 0V, T_C = 25°C		51		A
Reverse recovery time	t_{rr}	V_{GS} = 0V, I_{SD} = 30A, V_{DS} = 400V, di/dt = 300A/μs		131		ns
Reverse recovery charge	Q_{rr}			160		nC
Peak reverse recovery current	I_{rrm}			6.4		A

Gate Charge Characteristics (at T_C=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Value	Unit
Gate-source charge	Q_{GS}	V_{DS} = 800V, V_{GS} = -5/+20V, I_D = 30A	68	nC
Gate-drain charge	Q_{GD}		66	
Total gate charge	Q_G		229	
Gate plateau voltage	V_{pl}		7.9	V

Typical Rating and Characteristic Curves (CSMFP4OT040-HF)

Fig.1 - Forward Output Characteristics at T_J=25°C

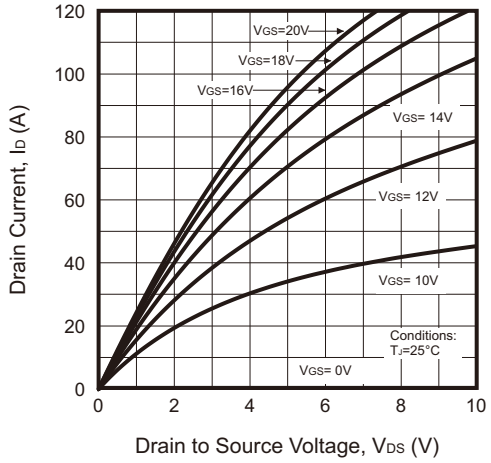


Fig.2 - Forward Output Characteristics at T_J=175°C

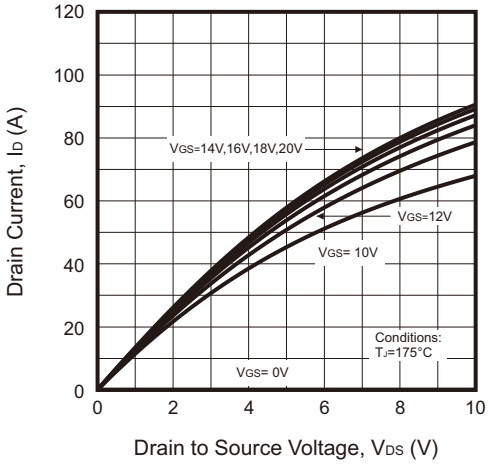


Fig.3 - On-Resistance vs. Drain Current for Various T_J

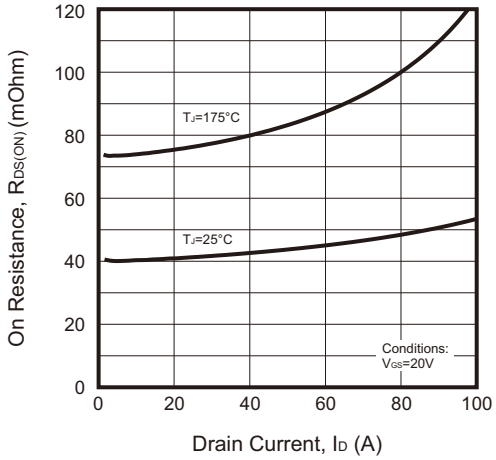


Fig.4 - Transfer Characteristics for for Various T_J

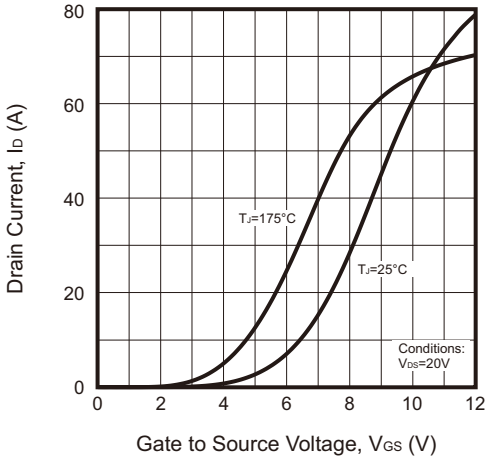


Fig.5 - On-Resistance vs. Gate Voltage for Various T_J

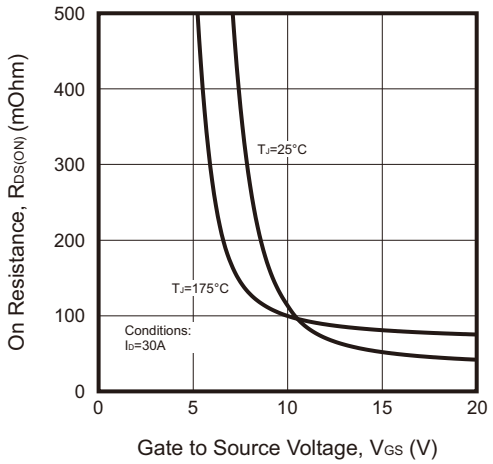
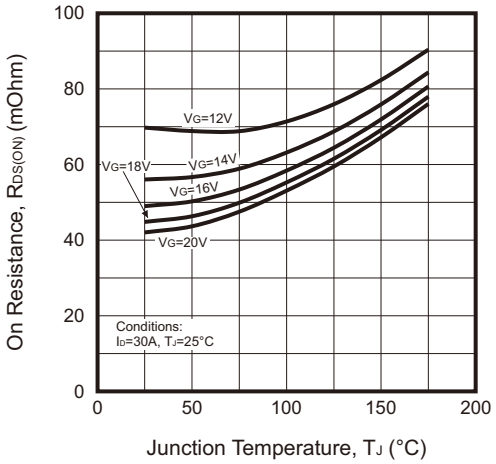


Fig.6 - On-Resistance vs. Temperature for Various Gate Voltage



Typical Rating and Characteristic Curves (CSMFP4OT040-HF)

Fig.7 - Normalized On-Resistance vs. Temperature

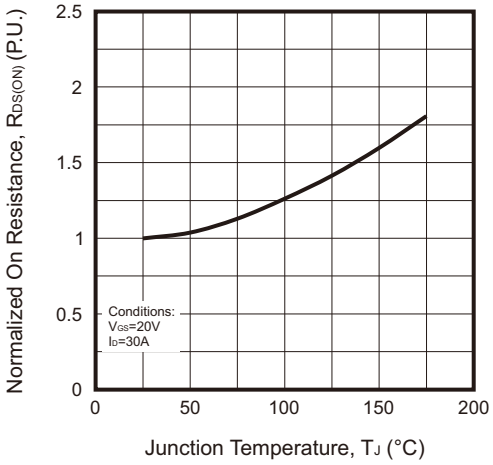


Fig.8 - Reverse Output Characteristics at T_J=25°C

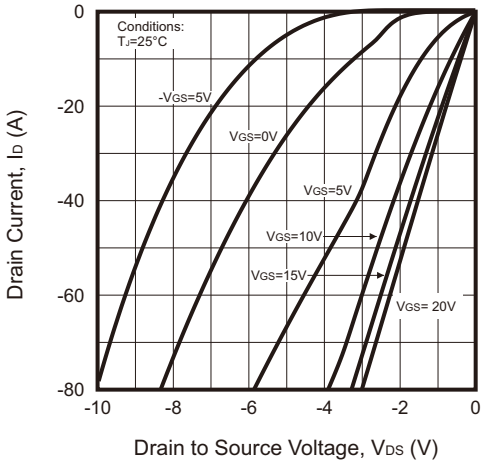


Fig.9 - Reverse Output Characteristics at T_J=175°C

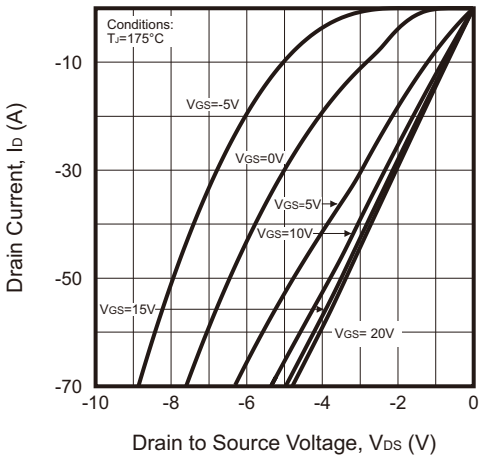


Fig.10 - Capacitance vs. Drain to Source Voltage

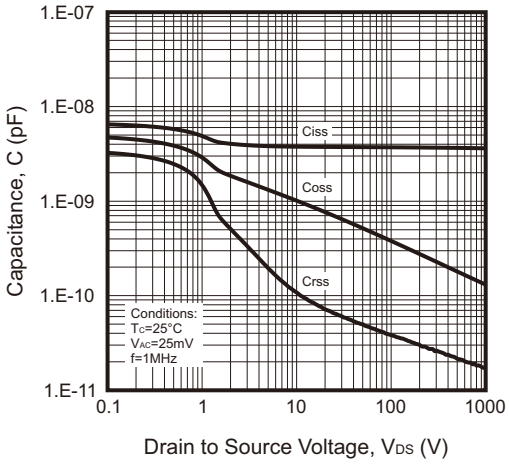


Fig.11 - Threshold Voltage vs. Temperature

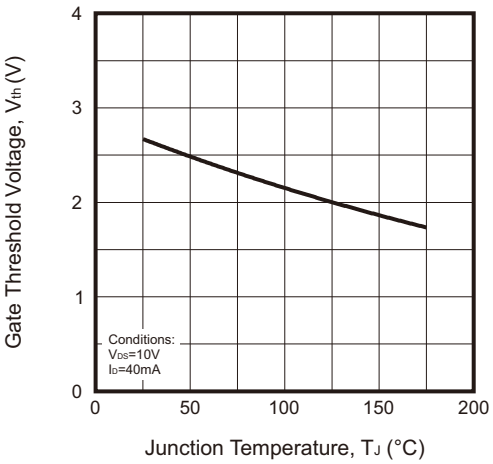
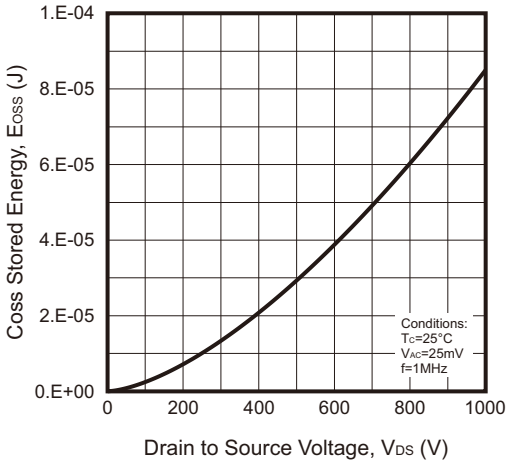


Fig.12 - Output Capacitor Stored Energy



Typical Rating and Characteristic Curves (CSMFP4OT040-HF)

Fig.13 - Max. Power Dissipation Derating vs. Case Temperature

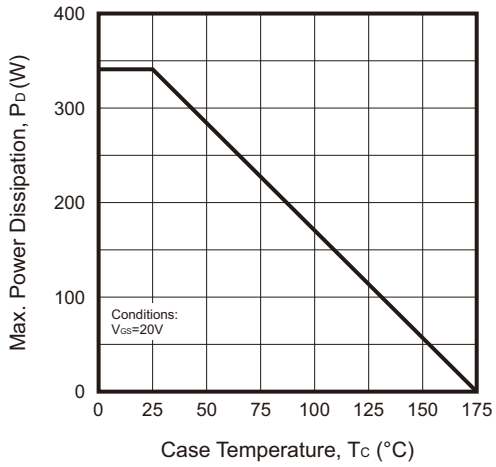


Fig.14 - Drain Current Derating vs. Case Temperature

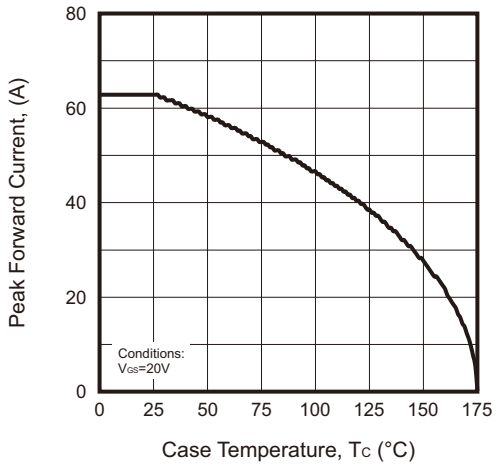


Fig.15 - Safe Operating Area

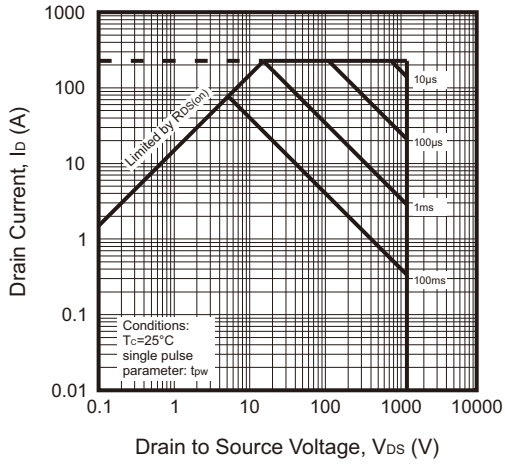


Fig.16 - Gate Charge Characteristics

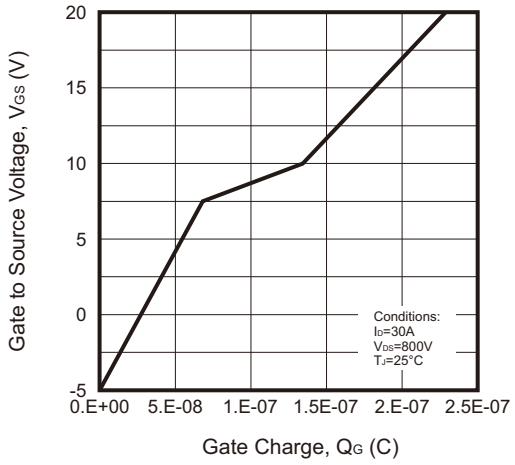


Fig.17 - Clamped Inductive Switching Energy vs. Drain Current

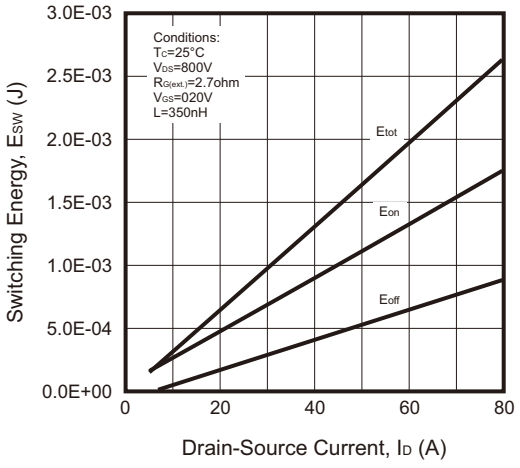
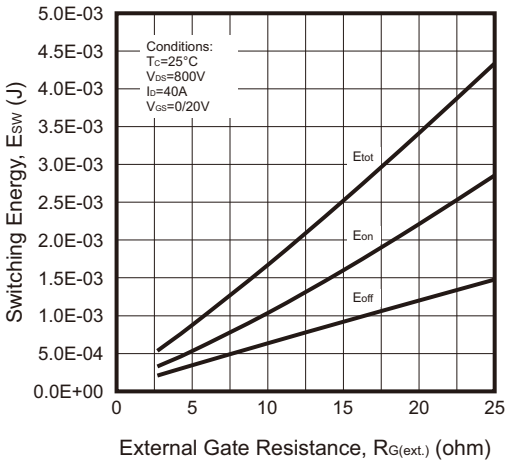
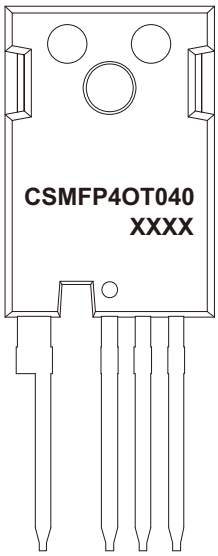


Fig.18 - Clamped Inductive Switching Energy vs. External Gate Resistor ($R_{G(ext.)}$)



Marking Code

Part Number	Marking Code
CSMFP4OT040-HF	CSMFP4O040



XXXX = Control code

Standard Packaging

Case Type	TUBE PACK
	TUBE (pcs)
TO-247-4L	30