

N-Channel Enhancement Mode Power MOSFET

Description

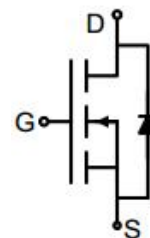
The GT013N04Q uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

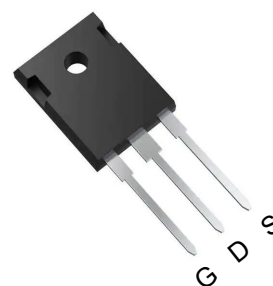
- V_{DS} 40V
- I_D (at $V_{GS} = 10V$) 195A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 2.2m Ω
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-247

Ordering Information

Device	Package	Marking	Packaging
GT013N04Q	TO-247	GT013N04	30pcs/Tube

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Continuous Drain Current	I_D	195	A
		123	
Pulsed Drain Current (note1)	I_{DM}	780	A
Gate-Source Voltage	V_{GS}	± 20	V
Power Dissipation	P_D	96	W
Single pulse avalanche energy (note2)	E_{AS}	182	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	50	$^\circ\text{C/W}$
Maximum Junction-to-Case	R_{thJC}	1.3	$^\circ\text{C/W}$

Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	40	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 40V, V _{GS} = 0V	--	--	1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	2.0	3.0	4.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 30A	--	1.7	2.2	mΩ
Forward Transconductance	g _{FS}	V _{GS} = 5V, I _D = 30A	--	48	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 20V, f = 1.0MHz	--	3950	--	pF
Output Capacitance	C _{oss}		--	970	--	
Reverse Transfer Capacitance	C _{rss}		--	920	--	
Total Gate Charge	Q _g	V _{DD} = 20V, I _D = 20A, V _{GS} = 10V	--	50	--	nC
Gate-Source Charge	Q _{gs}		--	12	--	
Gate-Drain Charge	Q _{gd}		--	4	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 20V, I _D = 20A, R _G = 3Ω	--	11	--	ns
Turn-on Rise Time	t _r		--	3	--	
Turn-off Delay Time	t _{d(off)}		--	36	--	
Turn-off Fall Time	t _f		--	3	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	195	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 30A, V _{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = 20A, V _{GS} = 0V di/dt=500A/us	--	45	--	nC
Reverse Recovery Time	T _{rr}		--	17	--	ns

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition : $T_J = 25^{\circ}\text{C}$, $V_{DD} = 40V$, $V_{GS} = 10V$, $L = 0.5mH$, $R_G = 25\Omega$

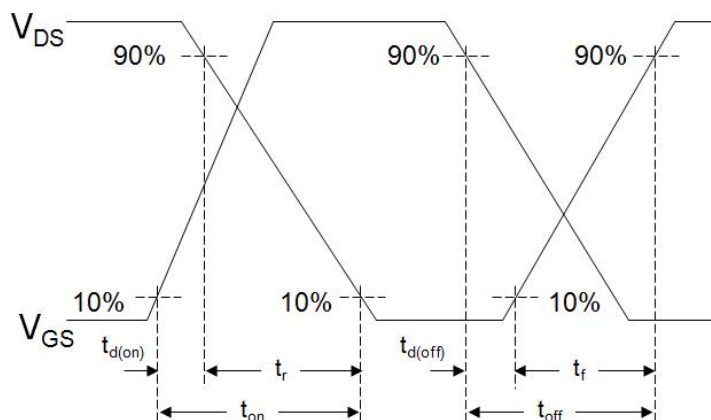
The table shows the minimum avalanche energy, which is 506mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

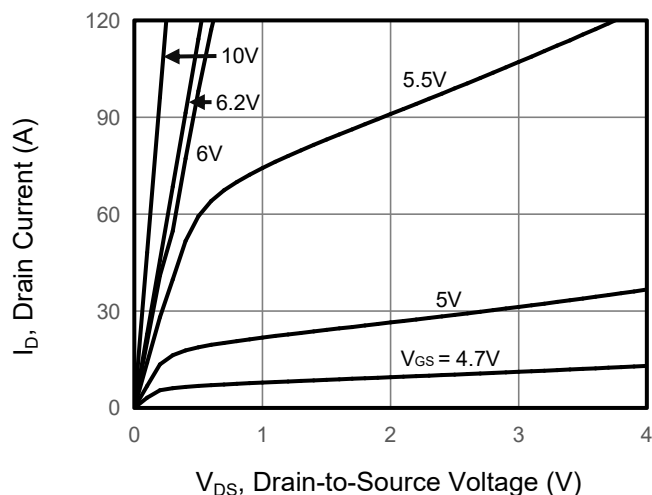


Figure 2. Transfer Characteristics

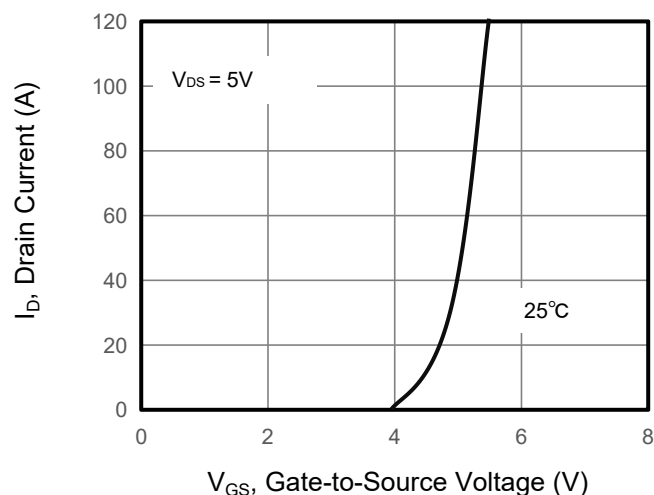


Figure 3. Drain Source On Resistance

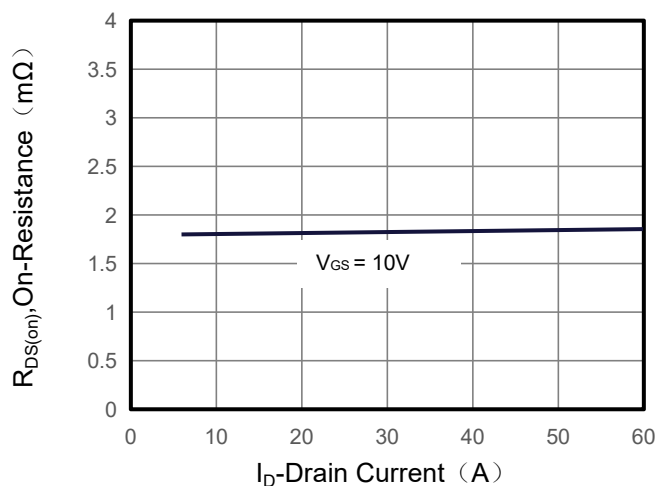


Figure 4. Gate Charge

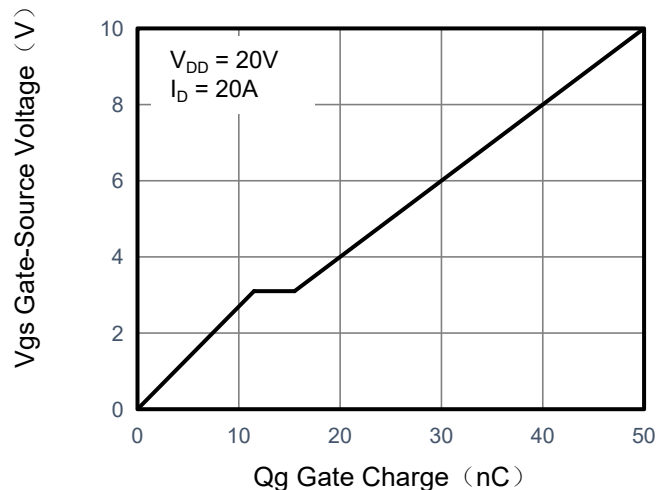


Figure 5. Capacitance

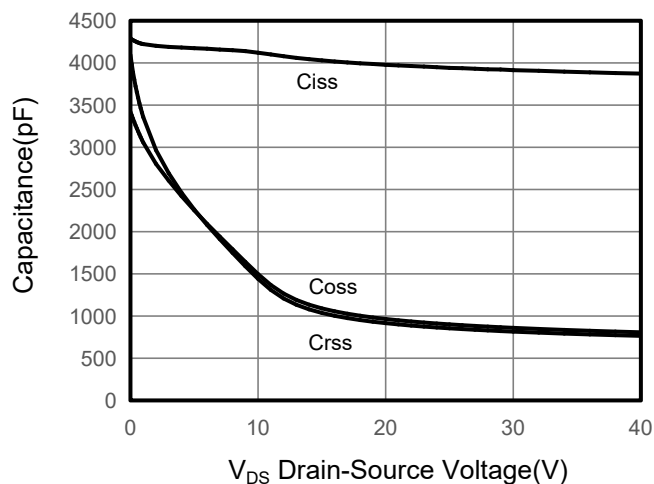
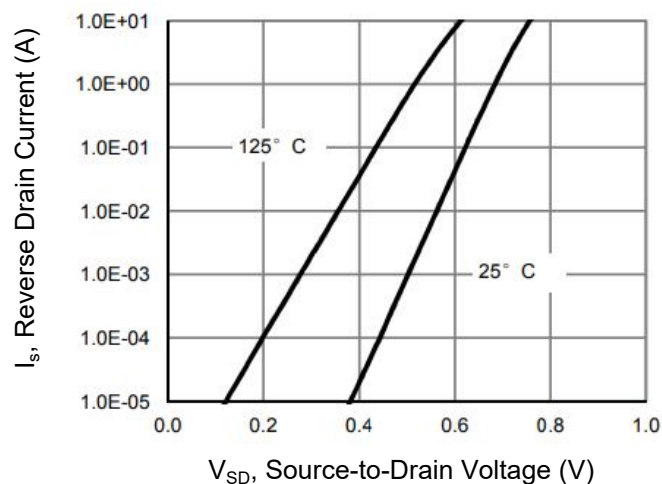


Figure 6. Source-Drain Diode Forward



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Drain-Source On-Resistance

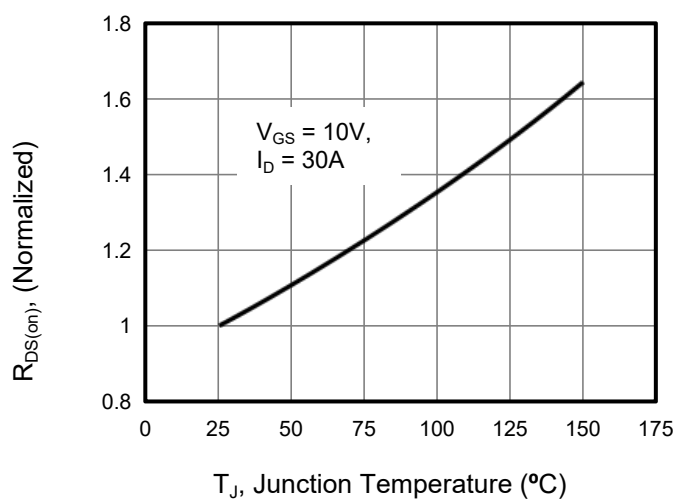


Figure 8. Safe Operation Area

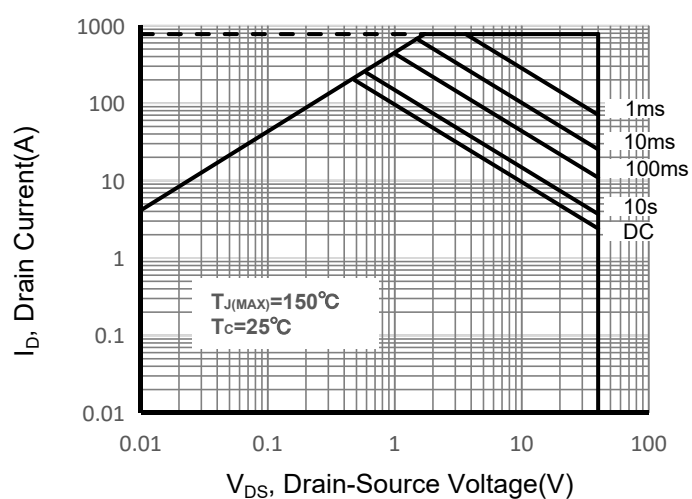


Figure 9. Maximum Continuous Drain Current vs Case Temperature

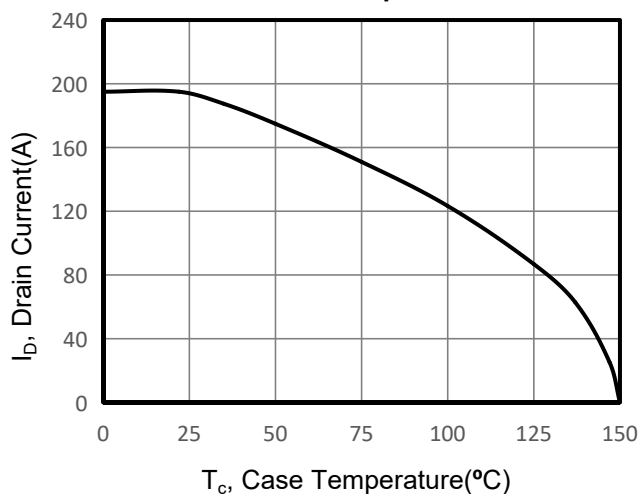
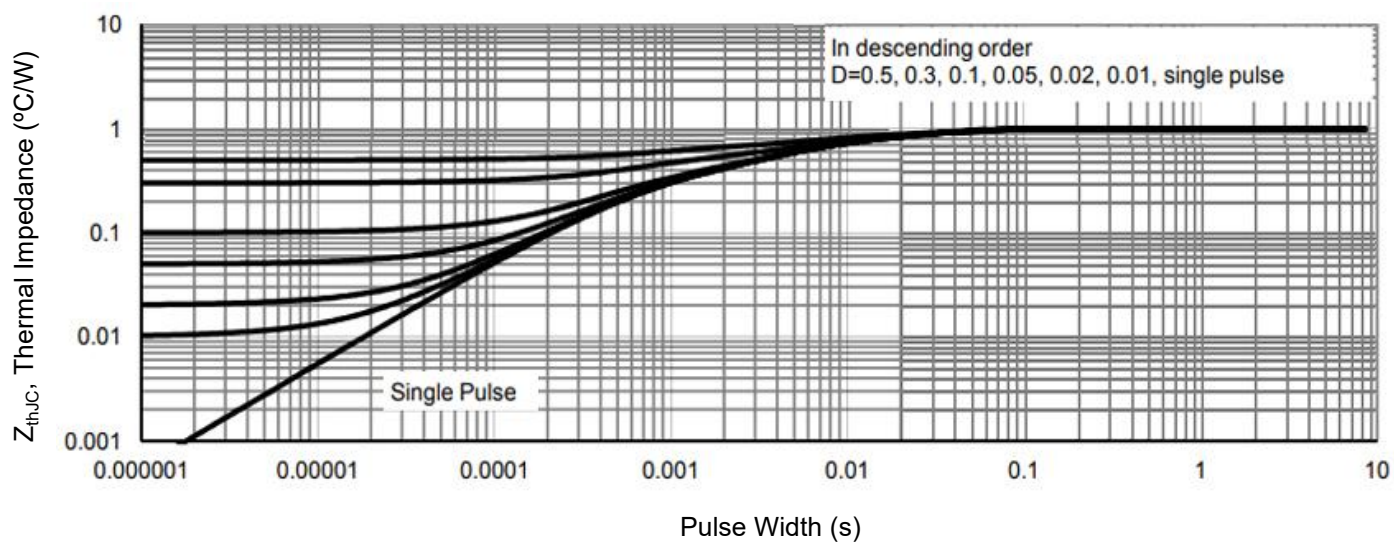
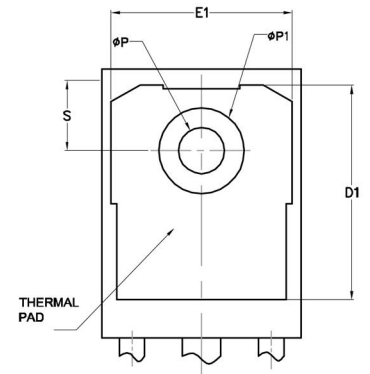
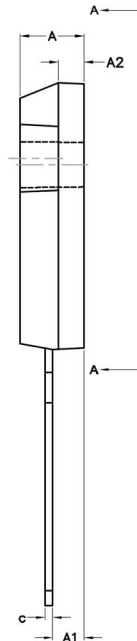
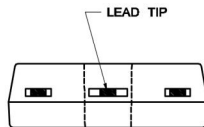
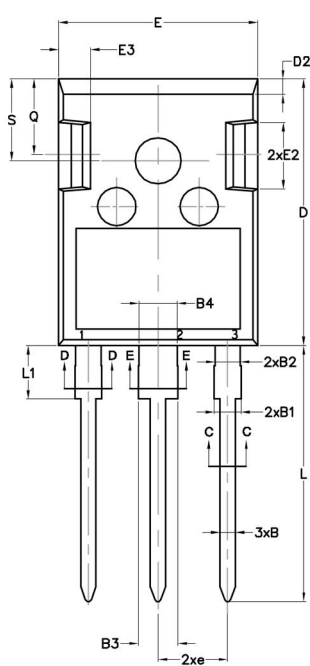


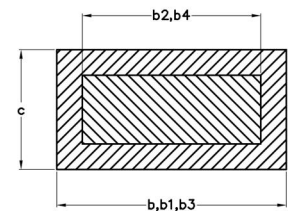
Figure 10. Normalized Maximum Transient Thermal Impedance



TO-247 Package Information



VIEW A-A



SECTION C-C, D-D, E-E

SYMBOLS	DIMENSIONS			
	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A	4.85	5.15	0.191	0.203
A1	2.25	2.55	0.088	0.100
A2	1.85	2.15	0.073	0.085
B	1.04	1.33	0.041	0.052
B1	1.90	2.35	0.075	0.093
B2	1.90	2.15	0.075	0.085
B3	2.90	3.35	0.114	0.132
B4	2.90	3.15	0.114	0.124
c	0.55	0.68	0.022	0.027
D	20.8	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.10	0.618	0.634
E1	13.50	14.20	0.531	0.559
E2	3.80	5.00	0.150	0.197
E3	1.00	2.6	0.039	0.102
e	5.46BSC		0.215BSC	
L	19.80	20.3	0.779	0.799
L1	4.00	4.50	0.157	0.177
φP	3.50	3.70	0.138	0.145
φP1	—	7.19	—	0.291
Q	5.40	6.00	0.212	0.236
S	6.2BSC		0.244BSC	