

Features

- Fully Automotive Qualified to AEC-Q101
- Split Gate Trench MOSFET Technology
- Excellent Package For Heat Dissipation
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note 1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

Maximum Ratings

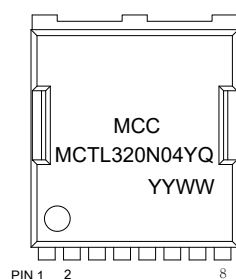
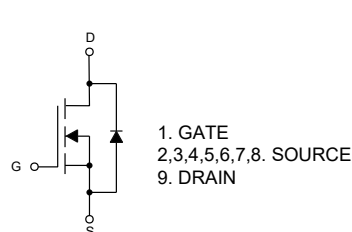
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 40°C/W Junction to Ambient (Note 2)
- Thermal Resistance: 0.7°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	A
		$T_C=100^\circ\text{C}$	
Pulsed Drain Current (Note 3)	I_{DM}	1280	A
Total Power Dissipation (Note 4)	P_D	214	W
Avalanche Energy (Note 5)	E_{AS}	1441	mJ

Note:

- Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$.
- Repetitive rating; pulse width limited by max. junction temperature.
- P_D is based on max. junction temperature, using junction-case thermal resistance.
- $T_J=25^\circ\text{C}$, $V_{DD}=30\text{V}$, $V_{GS}=10\text{V}$, $L=3\text{mH}$.

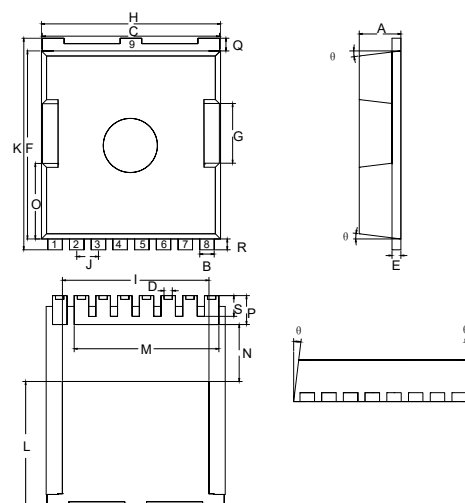
Internal Structure and Marking Code



YYWW: 4 codes in total
YY is the year
WW is the week

N-CHANNEL MOSFET

TOLL-8L



DIMENSIONS

DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.087	0.094	2.20	2.40	
B	0.028	0.035	0.70	0.90	
C	0.382	0.390	9.70	9.90	
D	0.017	0.020	0.42	0.50	
E	0.016	0.024	0.40	0.60	
F	0.405	0.417	10.28	10.58	
G	0.122	0.138	3.10	3.50	
H	0.382	0.398	9.70	10.10	
I	0.311	0.327	7.90	8.30	
J	0.047		1.20		BSC
K	0.452	0.468	11.48	11.88	
L	0.266	0.281	6.75	7.15	
M	0.315		8.00		
N	0.118	0.130	3.00	3.30	
O	0.157	0.172	3.98	4.38	
P	0.055	0.071	1.40	1.80	
Q	0.024	0.031	0.60	0.80	
R	0.020	0.028	0.50	0.70	
S	0.039	0.051	1.00	1.30	
θ	4°	10°	4°	10°	

Electrical Characteristics @ 25°C (Unless Otherwise Specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =250μA	40			V
Gate-Source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V			1	uA
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =1mA	2	3	4	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =75A		0.8	1.1	mΩ
		V _{GS} =6V, I _D =20A		1.1	1.5	
Gate Resistance	R _g	V _{GS} =0V, f=1MHz		2.7		Ω
Dynamic Characteristics						
Continuous Body Diode Current	I _S				320	A
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F =50A,di/dt=100A/us		58		ns
Body Diode Reverse Recovery charge	Q _{rr}			63		nC
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =25V,V _{GS} =0V,f=1MHz		6914		pF
Output Capacitance	C _{oss}			1875		
Reverse Transfer Capacitance	C _{rss}			318		
Total Gate Charge	Q _g	V _{DS} =20V,V _{GS} =10V,I _D =50A		88		nC
Gate-Source Charge	Q _{gs}			29		
Gate-Drain Charge	Q _{gd}			10		
Turn-On Delay Time	t _{d(on)}	V _{GS} =10V, V _{DD} =20V, R _G =2.5Ω, I _D =50A		17		ns
Turn-On Rise Time	t _r			12		
Turn-Off Delay Time	t _{d(off)}			56		
Turn-Off Fall Time	t _f			25		

Fig. 1 - Typical Output Characteristics

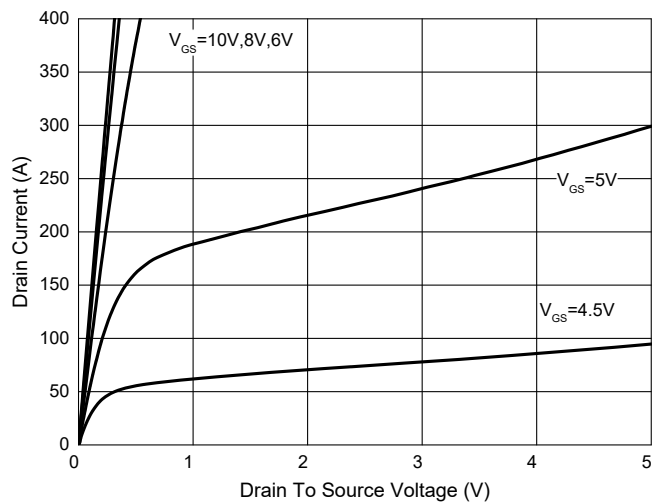


Fig. 2 - Transfer Characteristics

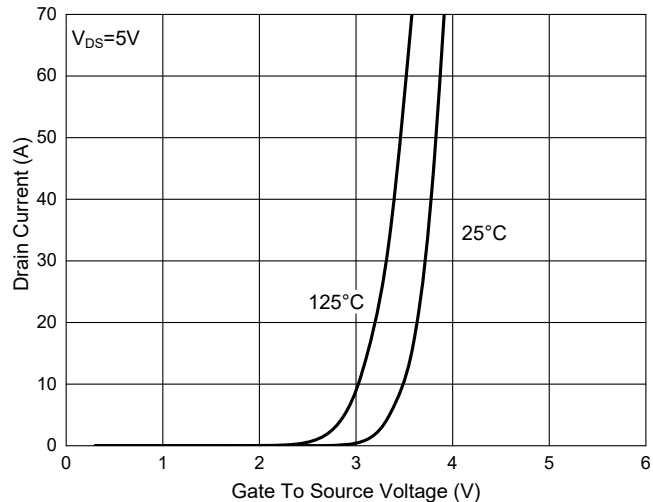


Fig. 3 - $R_{DS(ON)} - V_{GS}$

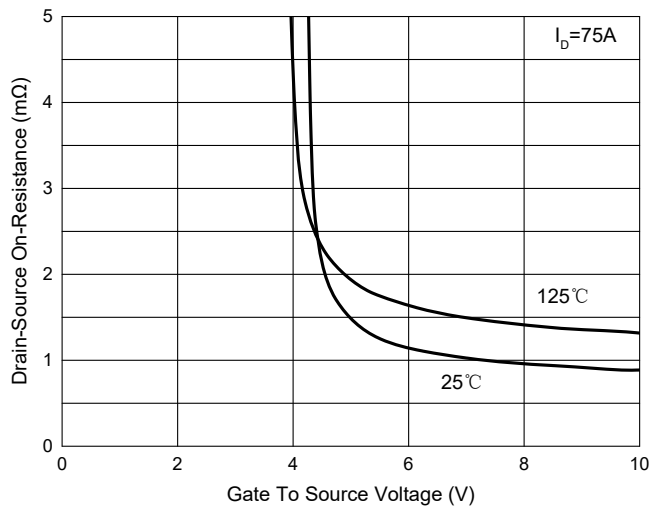


Fig. 4 - $R_{DS(ON)} - I_D$

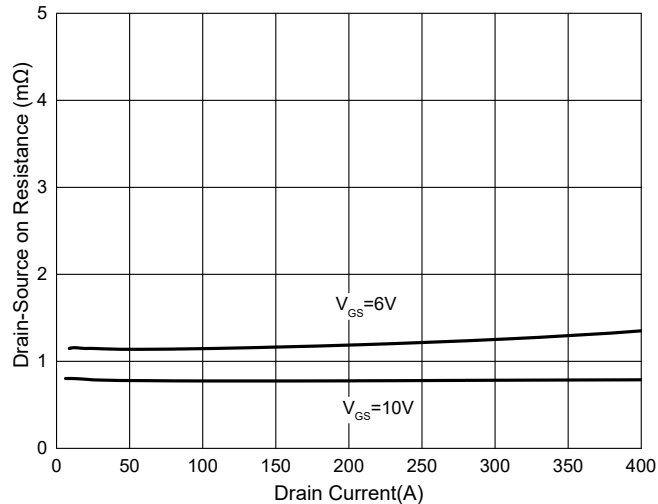


Fig. 5 - Capacitance Characteristics

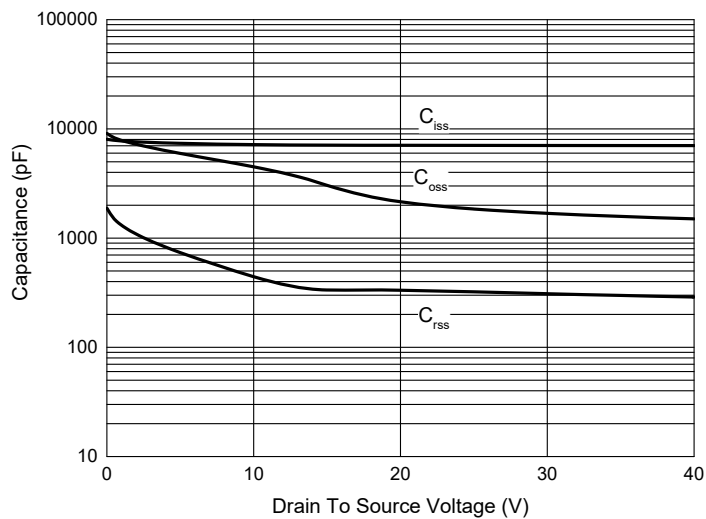


Fig. 6 - Gate Charge

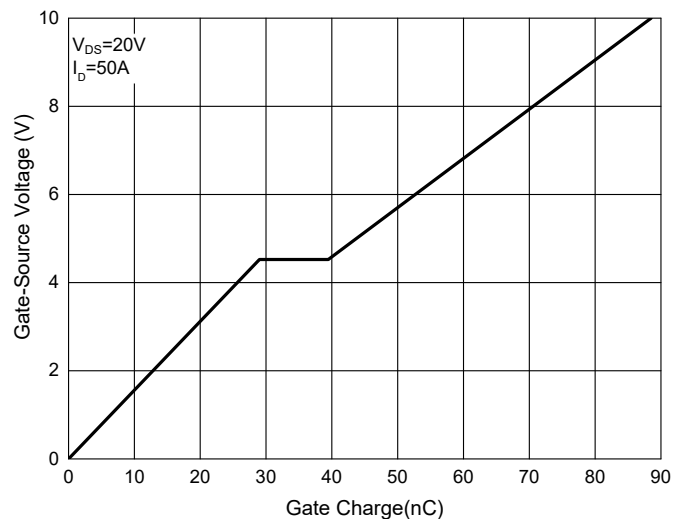


Fig. 7 - Normalized Threshold Voltage

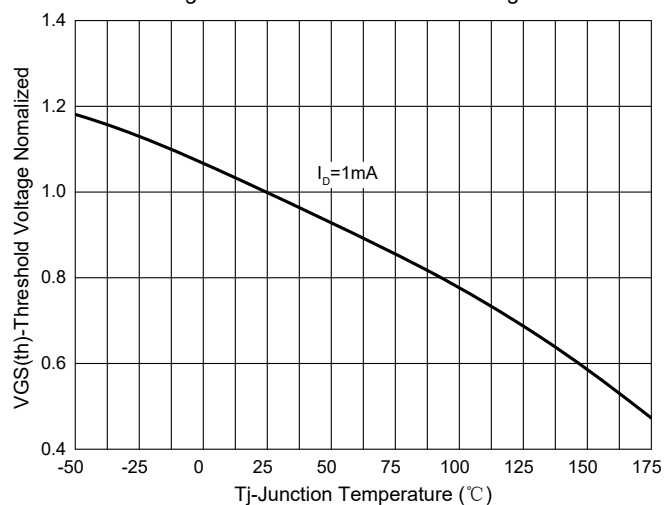


Fig. 8 - Normalized On Resistance Characteristics

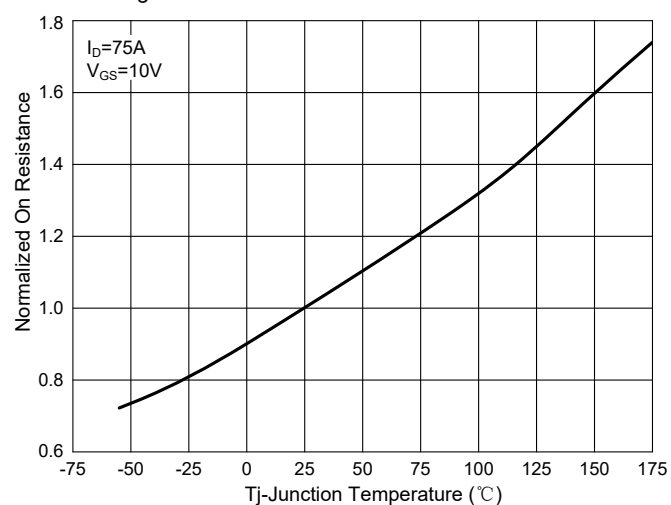


Fig. 9 - $I_S - V_{SD}$

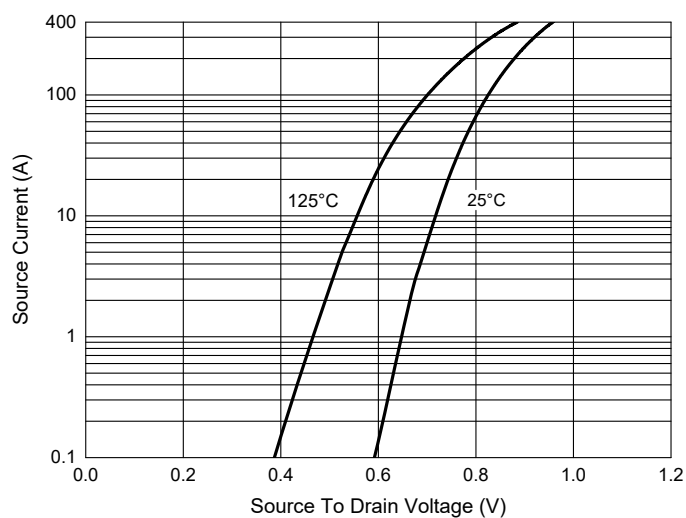


Fig. 10 - Drain Current

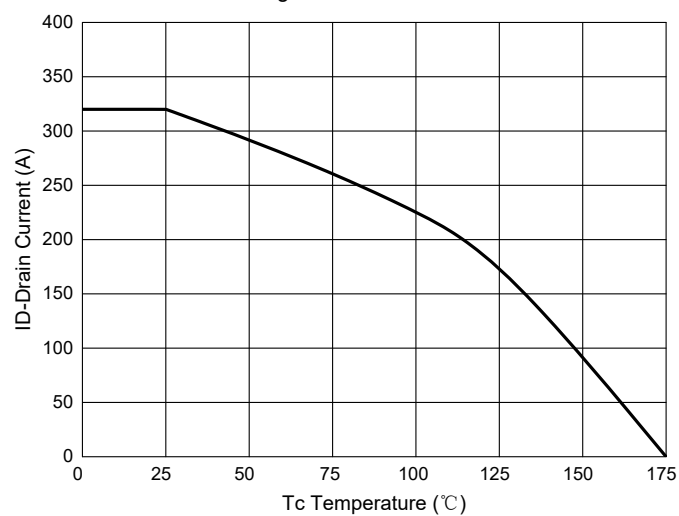


Fig.11-PD Dissipation

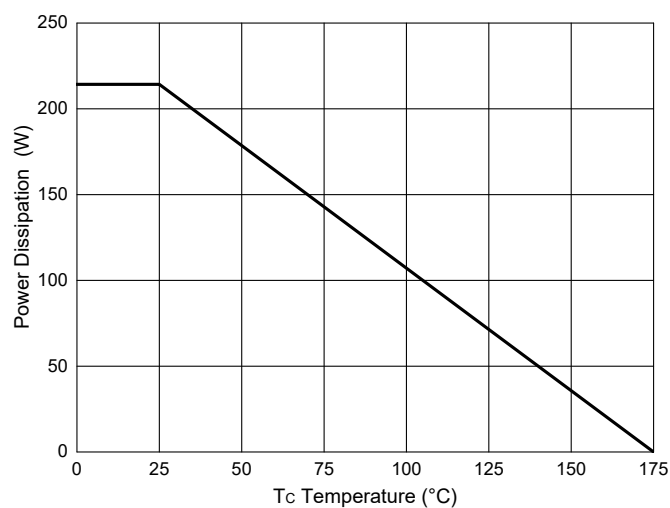


Figure 10 is a graph showing Drain Current (A) versus Drain-Source Voltage (V) for the MOSFET. The y-axis is logarithmic, ranging from 0.1 A to 10,000 A. The x-axis is logarithmic, ranging from 0.1 V to 100 V. The graph displays several curves representing different pulse widths: 1us, 10us, 100us, 1ms, and 10ms. The 1us curve is labeled $R_{DS(on)}$ Limited. The DC region is labeled DC. The graph also specifies $T_J(MAX)=175^{\circ}C$, $T_C=25^{\circ}C$, and Single Pulse.

Figure 10 is a graph showing the relationship between $Z_{th}(J-C)$ Normalized Resistance (Y-axis, logarithmic scale from $1E-4$ to 10) and Pulse Width (s) (X-axis, logarithmic scale from $1E-6$ to 1). The graph displays multiple curves for different duty cycle values (D), ranging from 0.5 to 0.01 , and a single pulse case. The curves generally increase with pulse width and converge towards a value of 1 for pulse widths greater than 0.1 seconds. An inset diagram shows a pulse waveform with parameters P_{DM} , T_{ON} , and T .

Parameters and Equations:

- $D = T_{on}/T$
- $T_J, P_K = T_c + P_{dm} \cdot Z_{\theta jc} \cdot R_{\theta jc}$
- $R_{\theta jc} = 0.7^\circ C/W$

Curves are labeled: "In descending order $D=0.5, 0.3, 0.2, 0.1, 0.05, 0.02, 0.01$, single pulse".

Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 2Kpcs/Reel

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