

## Features

- Fully Automotive Qualified to AEC-Q101
- ESD HBM Class 2
- Trench MV Mosfet Technology
- Moisture Sensitivity Level 1
- Halogen Free. "Green" Device (Note1)
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant (Note2)/("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

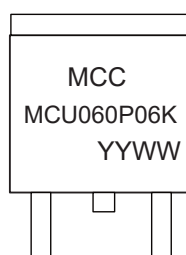
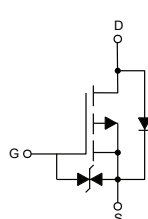
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 51°C/W Junction to Ambient (Note3)
- Thermal Resistance: 3.8°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage (Note4)	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	A
		$T_C=100^\circ\text{C}$	
Pulsed Drain Current (Note5)	$I_{DM}$	-68	A
Total Power Dissipation (Note6)	$P_D$	39	W
Single Pulsed Avalanche Energy (Note7)	$E_{AS}$	17.3	mJ

Note:

- Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
- High Temperature Solder Exemption Applied, see EU Directive Annex 7(a)-I.
- The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ .
- $V_{GS}=-20\text{V}/+10\text{V}$  according AEC-Q101 at  $T_j=175^\circ\text{C}$
- Repetitive rating; pulse width limited by max. junction temperature.
- $P_D$  is based on max. junction temperature, using junction-case thermal resistance.
- $T_j=25^\circ\text{C}$ ,  $V_{DD}=-30\text{V}$ ,  $V_{GS}=-10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.1\text{mH}$ .

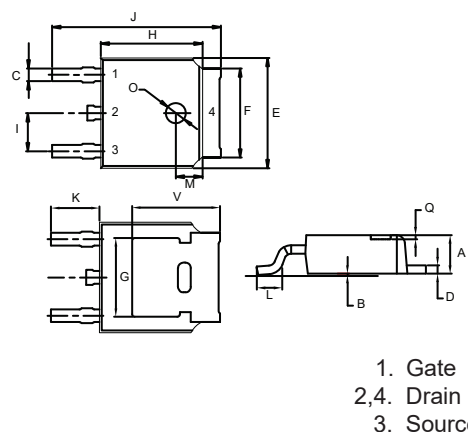
## Internal Structure and Marking Code



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

## P-Channel MOSFET

### DPAK(TO-252)



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.087	0.094	2.20	2.40	
B	0.000	0.005	0.00	0.13	
C	0.026	0.034	0.66	0.86	
D	0.018	0.023	0.46	0.58	
E	0.256	0.264	6.50	6.70	
F	0.201	0.215	5.10	5.46	
G	0.190		4.83		TYP.
H	0.236	0.244	6.00	6.20	
I	0.086	0.094	2.18	2.39	
J	0.386	0.409	9.80	10.40	
K	0.114		2.90		TYP.
L	0.055	0.067	1.40	1.70	
M	0.063		1.60		TYP.
O	0.043	0.051	1.10	1.30	
Q	0.000	0.012	0.00	0.30	
V	0.211		5.35		TYP.

**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-60			V
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±10	μA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V			-1	μA
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1.2	-2	-2.8	V
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A		46	60	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A		64	110	
Gate Resistance	R <sub>G</sub>	f=1 MHz, Open Drain		6.2		Ω
Diode Characteristics						
Continuous Body Diode Current	I <sub>S</sub>				-17	A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-10A			-1.2	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =-10A, dI <sub>F</sub> /dt=100A/μs		24		ns
Reverse Recovery Charge	Q <sub>rr</sub>			30		nC
Dynamic Characteristics						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-30V,V <sub>GS</sub> =0V,f=1MHz		1276		pF
Output Capacitance	C <sub>oss</sub>			79		
Reverse Transfer Capacitance	C <sub>rss</sub>			70		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-30V,V <sub>GS</sub> =-10V,I <sub>D</sub> =-10A		29.7		nC
Gate-Source Charge	Q <sub>gs</sub>			4.2		
Gate-Drain Charge	Q <sub>gd</sub>			5.8		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =-30V,V <sub>GS</sub> =-10V I <sub>D</sub> =-10A, R <sub>G</sub> =3Ω		8		ns
Turn-On Rise Time	t <sub>r</sub>			11		
Turn-Off Delay Time	t <sub>d(off)</sub>			39		
Turn-Off Fall Time	t <sub>f</sub>			20		

## Curve Characteristics

Fig.1- Typical Output Characteristics

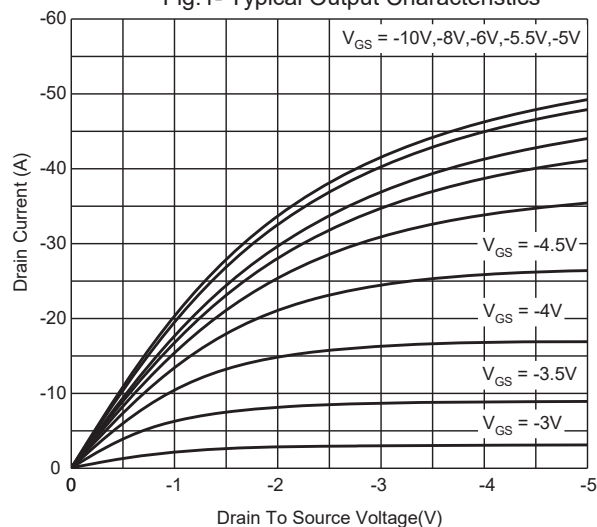


Fig.2- Transfer Characteristics

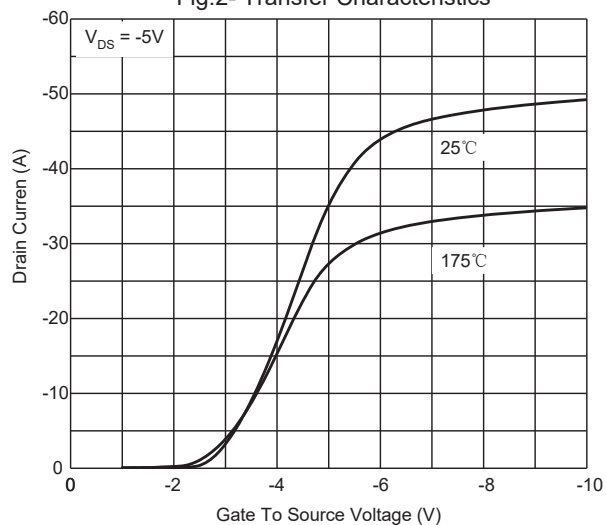


Fig.3-  $R_{DS(ON)} - V_{GS}$

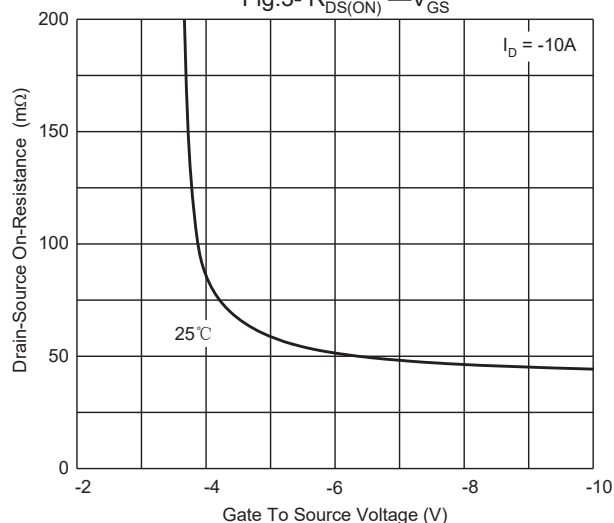


Fig.4-  $R_{DS(ON)} - I_D$

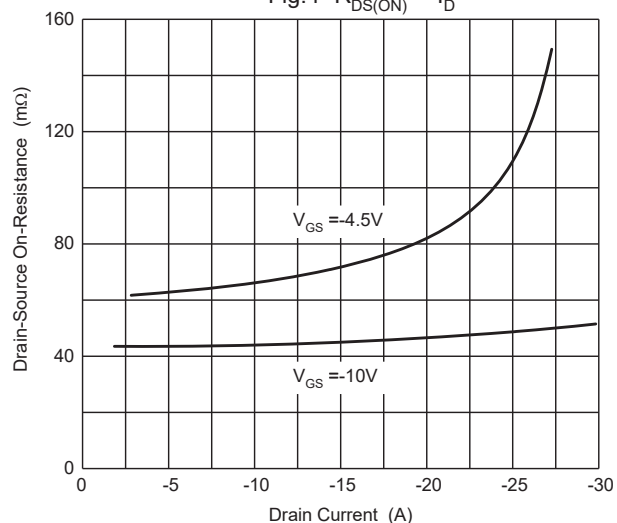


Fig.5- Capacitance Characteristics

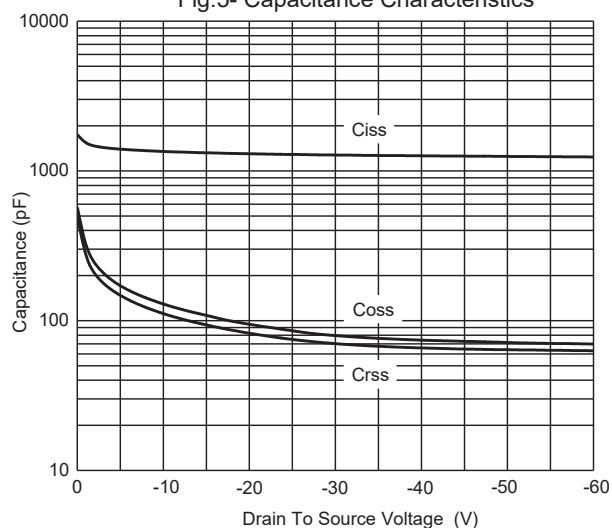
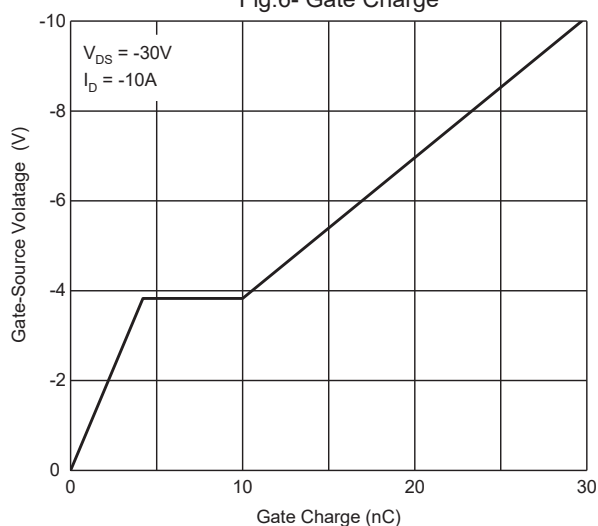


Fig.6- Gate Charge



## Curve Characteristics

Fig. 7 - Normalized Threshold Voltage

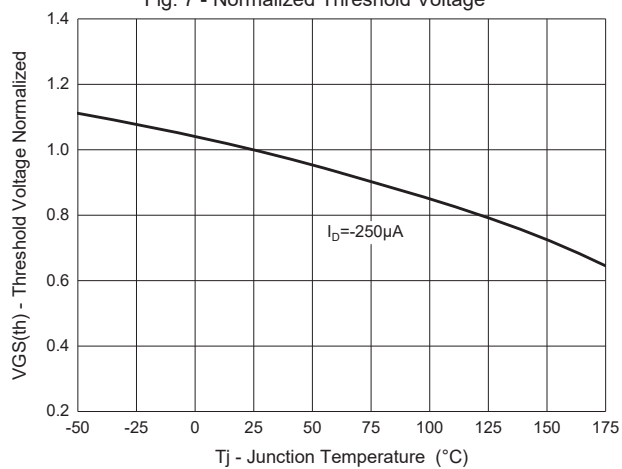


Fig. 8 - Normalized On Resistance Characteristics

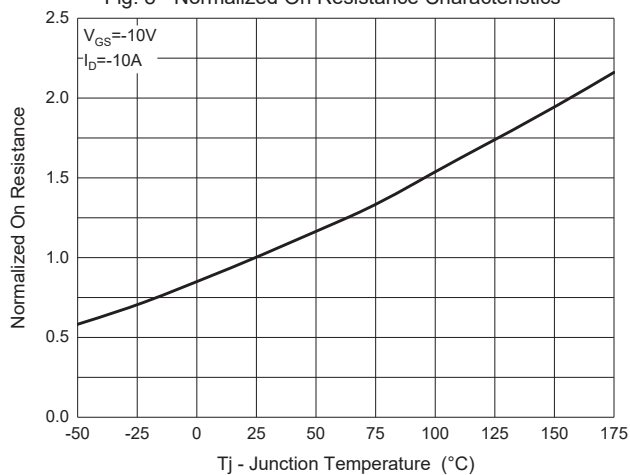


Fig. 9 -  $I_S$ - $V_{SD}$

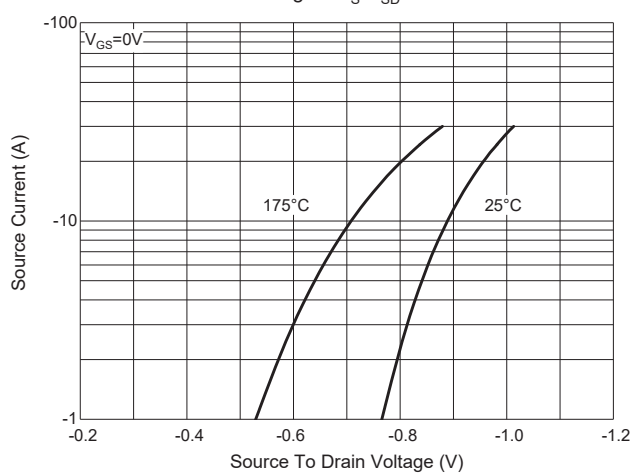


Fig. 10 - Drain Current

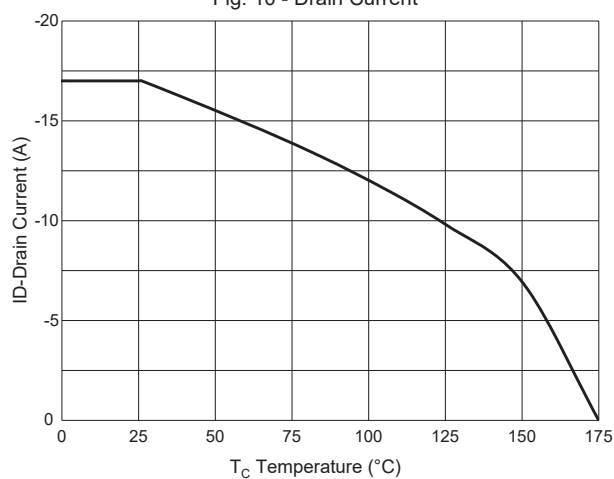
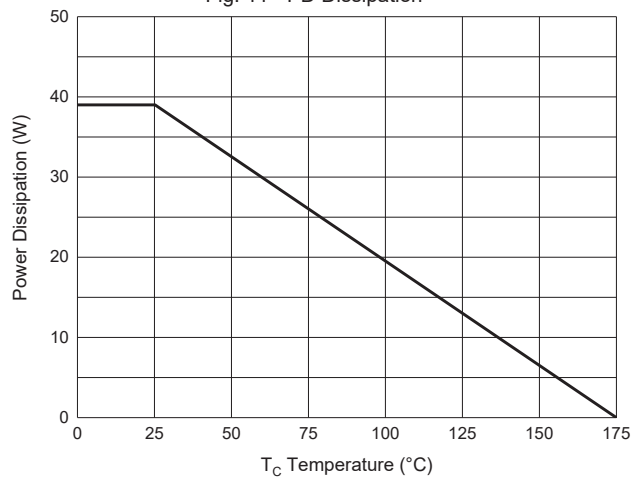


Fig. 11 - PD Dissipation



## Curve Characteristics

Fig. 12 - Safe Operation Area

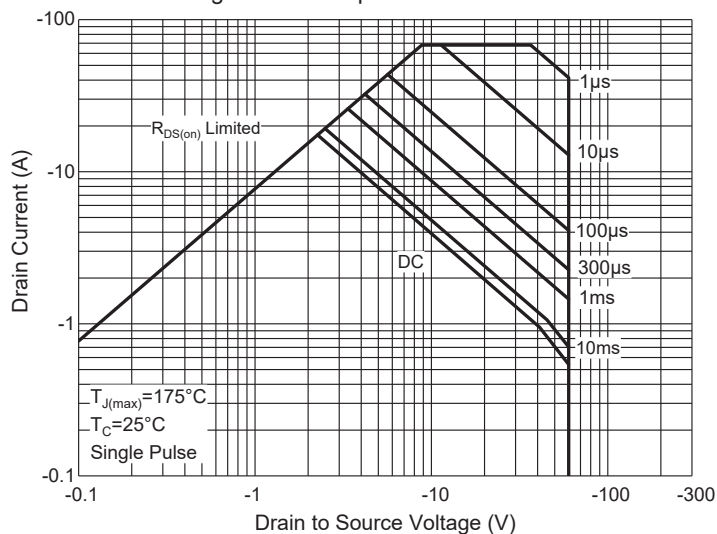
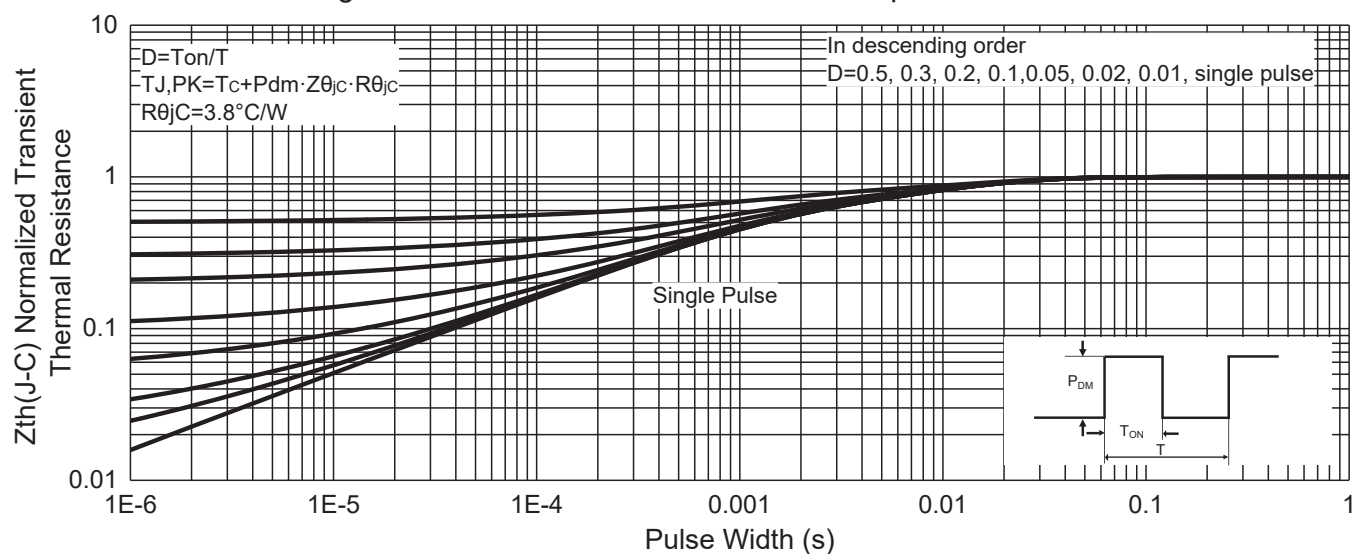


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 2.5Kpcs/Reel

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