

## Features

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

## Maximum Ratings

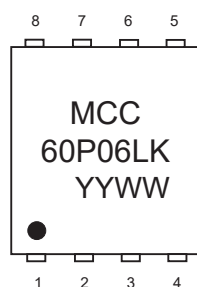
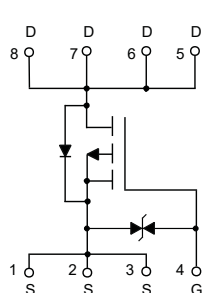
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 60°C/W Junction to Ambient (Note3)
- Thermal Resistance: 3.3°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage <sup>(Note4)</sup>	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	A
		$T_C=100^\circ\text{C}$	
Pulsed Drain Current <sup>(Note5)</sup>	$I_{DM}$	-72	A
Total Power Dissipation <sup>(Note6)</sup>	$P_D$	45	W
Single Pulsed Avalanche Energy <sup>(Note7)</sup>	$E_{AS}$	25	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  $T_A=25^\circ\text{C}$ .
- $V_{GS}=-20V/+10V$  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.
- $T_j=25^\circ\text{C}$ ,  $V_{DD}=-30V$ ,  $V_{GS}=-10V$ ,  $R_G=25\Omega$ ,  $L=0.1mH$ .

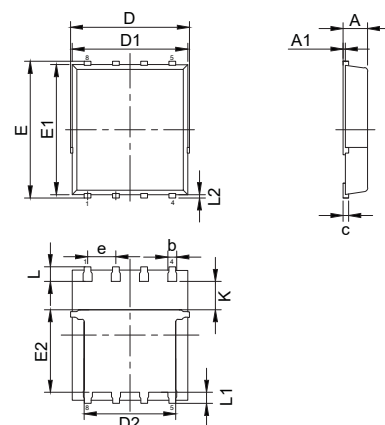
## Internal Structure and Marking Code



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

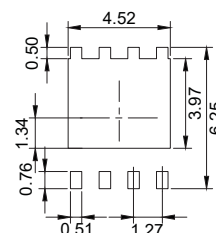
# P-CHANNEL MOSFET

## PDFN5060



DIM	INCH		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.039	0.052	1.00	1.30	
A1	0.000	0.004	0.00	0.10	
b	0.011	0.022	0.30	0.55	x8
c	0.010		0.25		TYP
D	0.192	0.219	4.90	5.55	
D1	0.185	0.215	4.70	5.45	
D2	0.149	0.171	3.80	4.32	
E	0.228	0.250	5.80	6.35	
E1	0.220	0.239	5.60	6.06	
E2	0.129	0.155	3.30	3.92	
e	0.050		1.27		TYP
K	0.053		1.34		TYP
L	0.011	0.030	0.30	0.76	
L1	0.015	0.030	0.40	0.75	
L2	0.006		0.15		TYP

## Suggested Solder Pad Layout



## 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	-1.9	-2.8	V
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-10A		45	60	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A		65	110	
Gate Resistance	R <sub>g</sub>	f=1MHz,Open Drain		7.5		Ω
Diode Characteristics						
Continuous Body Diode Current	I <sub>S</sub>				-18	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		27		ns
Reverse Recovery Charge	Q <sub>rr</sub>			39		nC
Dynamic Characteristics						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-30V,V <sub>GS</sub> =0V,f=1MHz		1274		pF
Output Capacitance	C <sub>oss</sub>			80		
Reverse Transfer Capacitance	C <sub>rss</sub>			69		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =-30V,V <sub>GS</sub> =-10V,I <sub>D</sub> =-10A		28.3		nC
Gate-Source Charge	Q <sub>gs</sub>			4.6		
Gate-Drain Charge	Q <sub>gd</sub>			5.6		
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =-30V,V <sub>GS</sub> =-10V, R <sub>G</sub> =3Ω, I <sub>DS</sub> =-10A		8.4		ns
Turn-On Rise Time	t <sub>r</sub>			11.5		
Turn-Off Delay Time	t <sub>d(off)</sub>			39		
Turn-Off Fall Time	t <sub>f</sub>			23		

## Curve Characteristics

Fig. 1 - Typical Output Characteristics

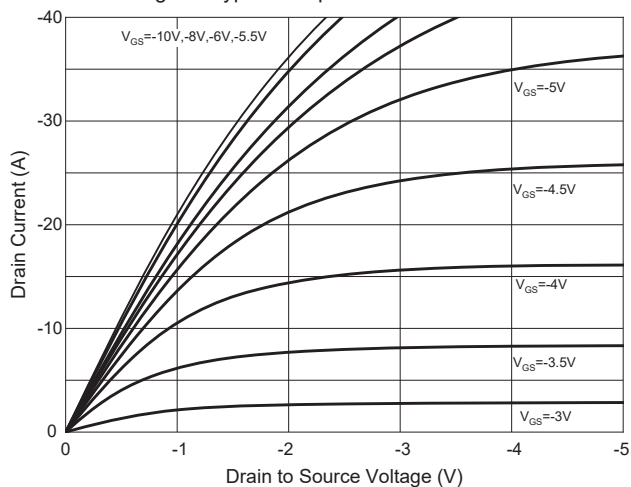


Fig. 2 - Transfer Characteristics

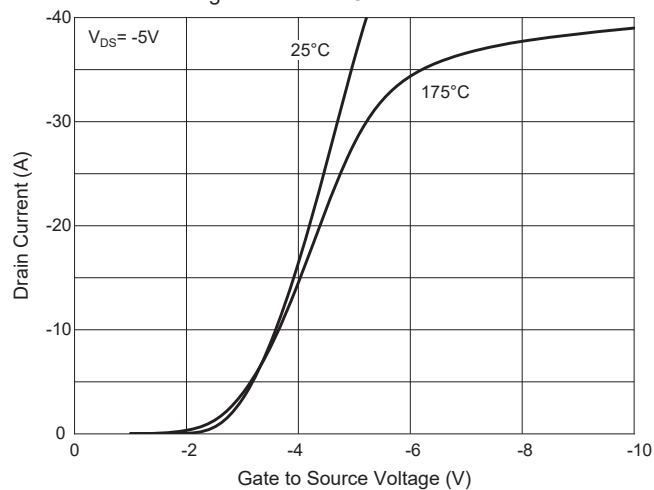


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

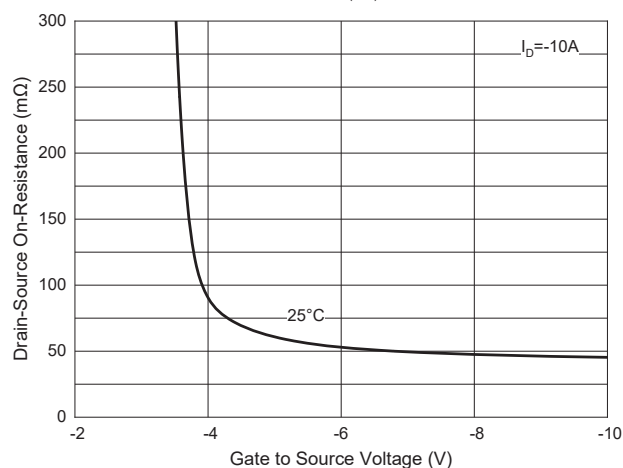


Fig. 4 -  $R_{DS(ON)} - I_D$

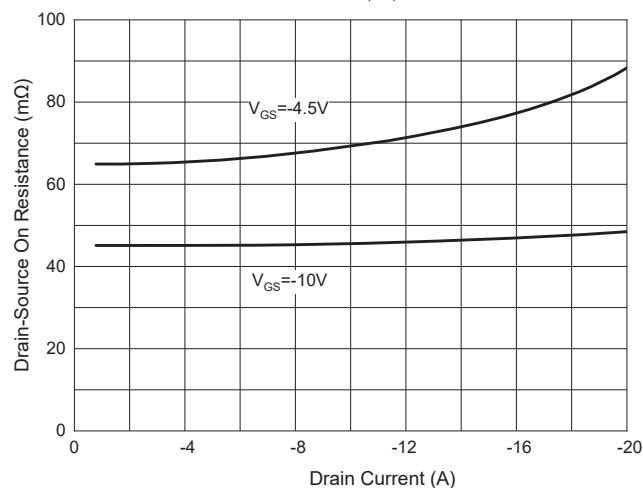


Fig. 5 - Capacitance Characteristics

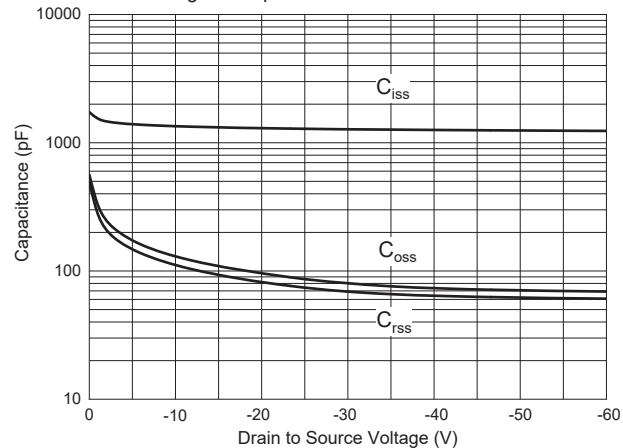
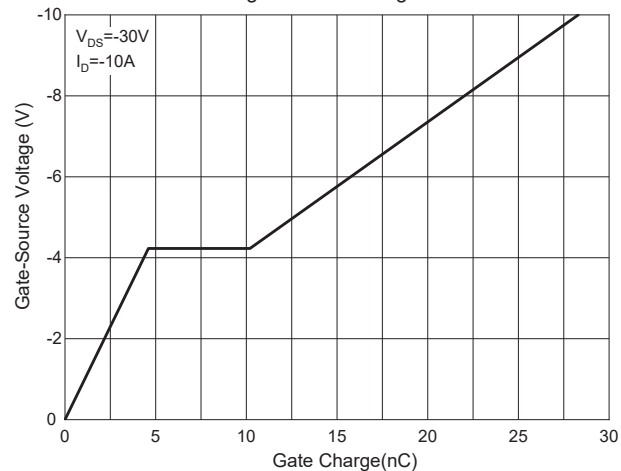


Fig. 6 - Gate Charge



## Curve Characteristics

Fig. 7 - Normalized Threshold Voltage

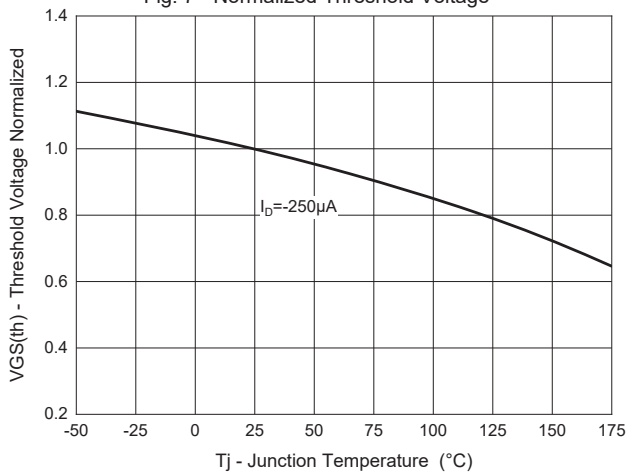


Fig. 8 - Normalized On Resistance Characteristics

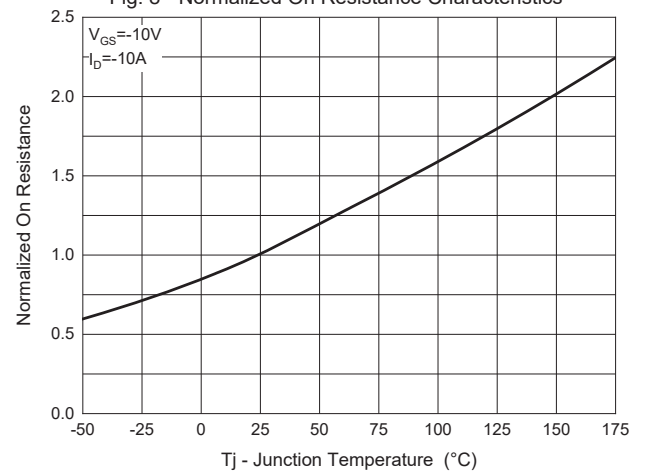


Fig. 9 -  $I_S$ - $V_{SD}$

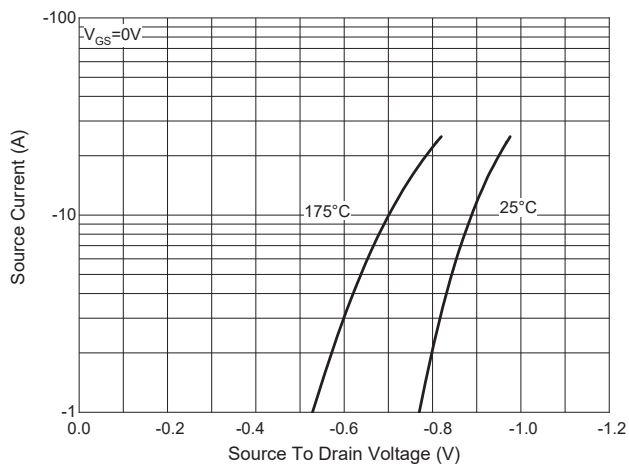


Fig. 10 - Drain Current

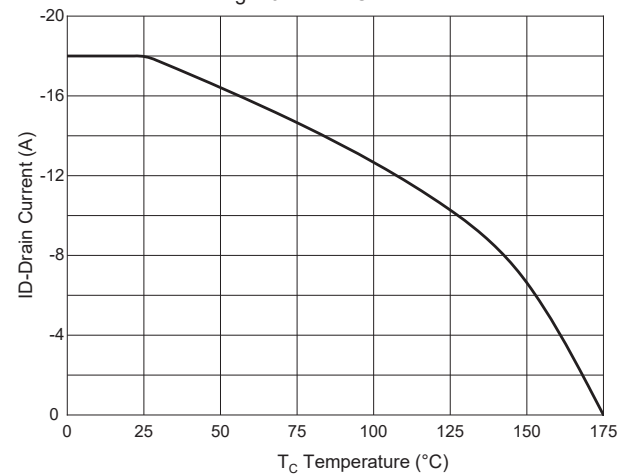
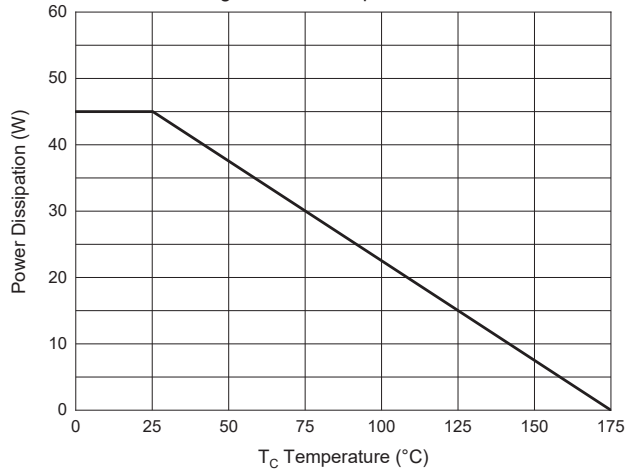


Fig. 11 - PD Dissipation



## Curve Characteristics

Fig. 12 - Safe Operation Area

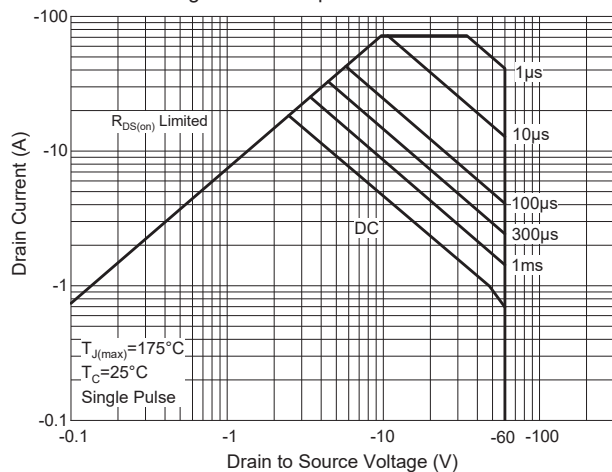
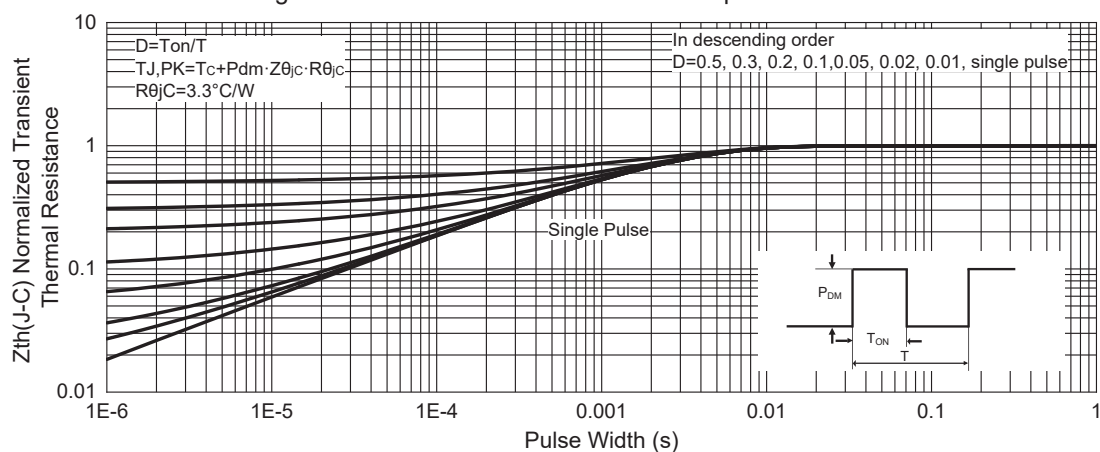


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

Device	Packing
Part Number-TP	Tape&Reel: 5Kpcs/Reel

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