

### Features

- AEC-Q101 Qualified
- Trench Power MV MOSFET Technology
- Low Thermal Resistance
- Moisture Sensitivity Level 3
- 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

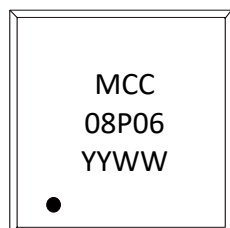
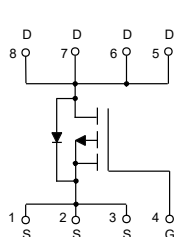
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 60°C/W Junction to Ambient (Note2)
- Thermal Resistance: 6°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	-8
		$T_C=100^\circ\text{C}$	-5
Pulsed Drain Current (Note3)	$I_{DM}$	-32	A
Total Power Dissipation (Note4)	$P_D$	20.8	W
Single Pulsed Avalanche Energy (Note5)	$E_{AS}$	50	mJ

Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. 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  $T_A=25^\circ\text{C}$ .
3. Repetitive rating; pulse width limited by max. junction temperature.
4.  $P_D$  is based on max. junction temperature, using junction-case thermal resistance.
5.  $T_J=25^\circ\text{C}$ ,  $V_{DD}=-50\text{V}$ ,  $V_{GS}=-10\text{V}$ ,  $R_G=25\Omega$ ,  $L=1\text{mH}$ .

### Internal Structure and Marking Code

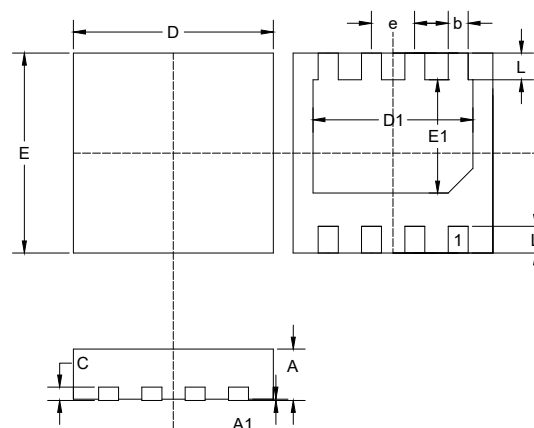


pin1

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

## P-CHANNEL MOSFET

### DFN3333-8



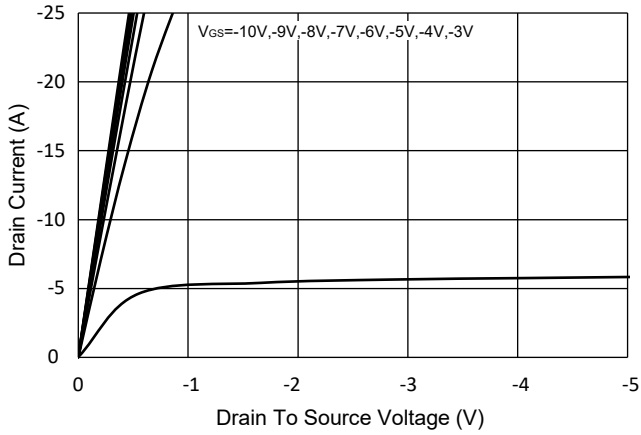
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.028	0.031	0.70	0.80	
A1	0.000	0.002	0.00	0.05	
C	0.008		0.20		TYP.
b	0.010	0.014	0.25	0.35	
D	0.130		3.30		TYP.
E	0.130		3.30		TYP.
e	0.026		0.65		TYP.
D1	0.100	0.110	2.55	2.80	
E1	0.065	0.074	1.64	1.89	
L	0.013	0.021	0.325	0.525	

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

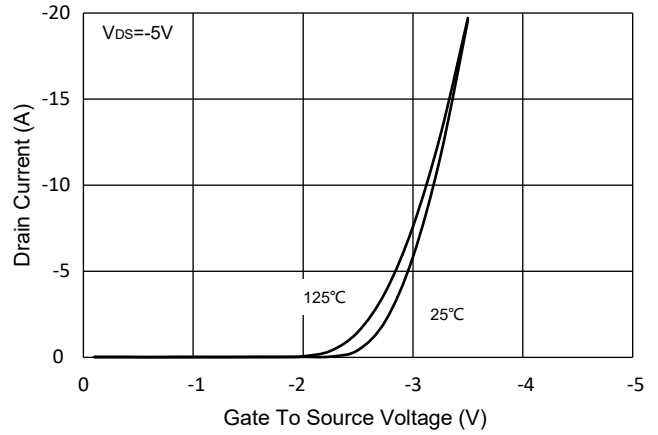
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-60			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 20V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-48V, V_{GS}=0V$			-1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.9	-3	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-6A$		20	28.4	m $\Omega$
		$V_{GS}=-4.5V, I_D=-3A$		24	39.3	
Gate Resistance	$R_g$	f=1Mhz, Open drain		5		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				-8	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=-3A$			-1.3	V
Reverse Recovery Time	$t_{rr}$	$I_F=-15A, dI_F/dt=100A/\mu s$		29		ns
Reverse Recovery Charge	$Q_{rr}$			38		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-30V, V_{GS}=0V, f=1MHz$		4306		pF
Output Capacitance	$C_{oss}$			178		
Reverse Transfer Capacitance	$C_{rss}$			158		
Total Gate Charge	$Q_g$	$V_{DS}=-30V, V_{GS}=-10V, I_D=-15A$		61		nC
Gate-Source Charge	$Q_{gs}$			17		
Gate-Drain Charge	$Q_{gd}$			7.1		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=-30V, V_{GS}=-10V, R_{GEN}=4.5\Omega, I_{DS}=-15A$		62		ns
Turn-On Rise Time	$t_r$			79		
Turn-Off Delay Time	$t_{d(off)}$			376		
Turn-Off Fall Time	$t_f$			161		

## Curve Characteristics

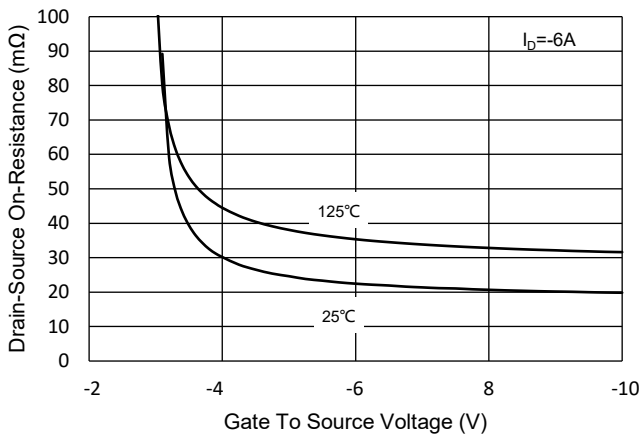
**Fig.1 - Typical Output Characteristics**



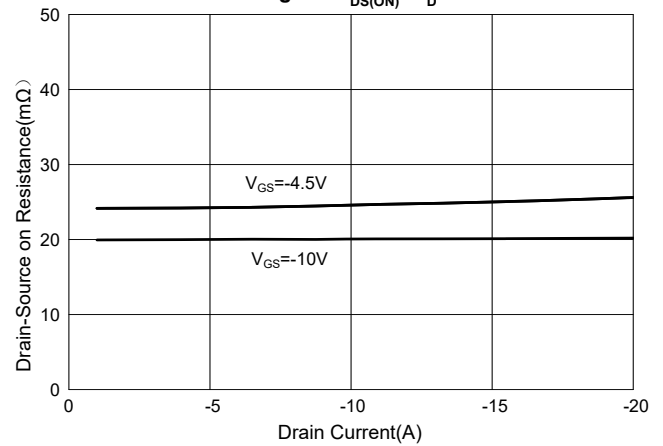
**Fig.2 - Transfer Characteristic**



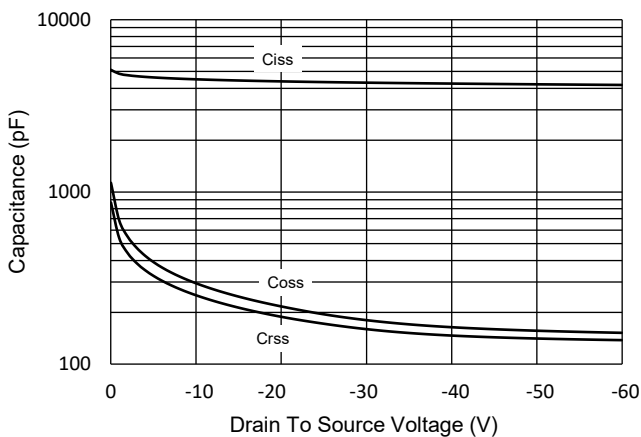
**Fig.3 -  $R_{DS(ON)}$  -  $V_{GS}$**



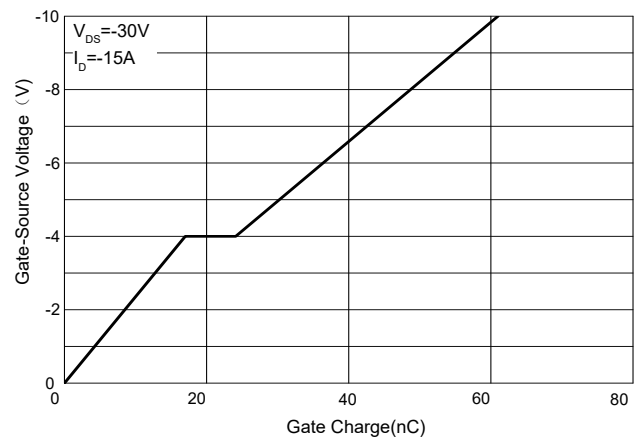
**Fig.4 -  $R_{DS(ON)}$  -  $I_D$**



**Fig.5 - Capacitance Characteristics**

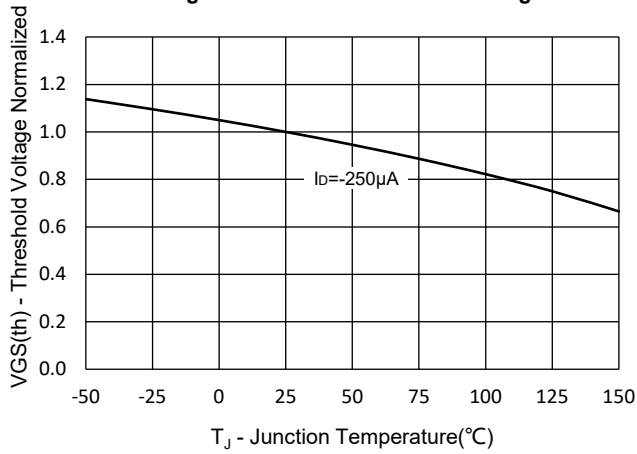


**Fig.6 - Gate Charge**

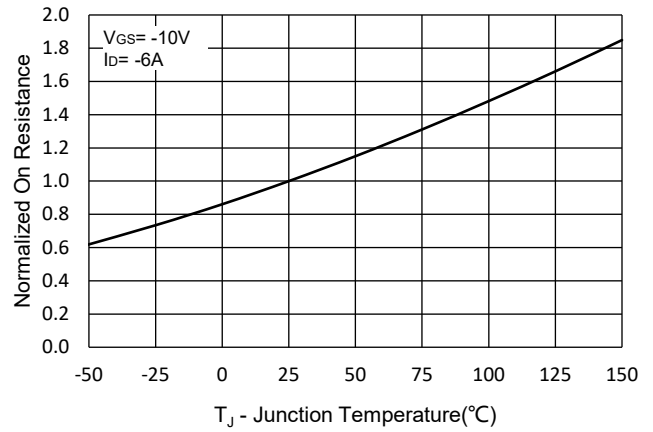


**Curve Characteristics**

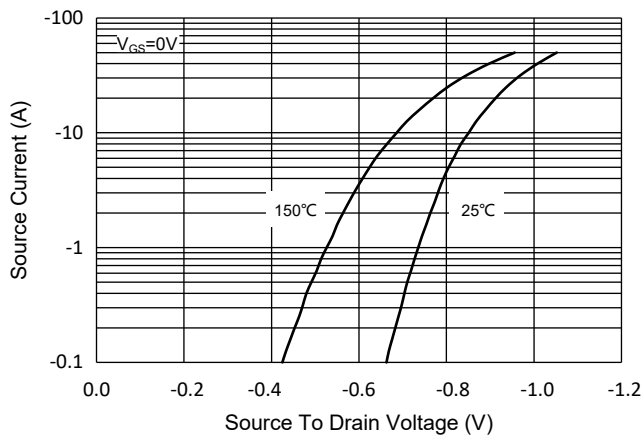
**Fig.7 - Normalized Threshold Voltage**



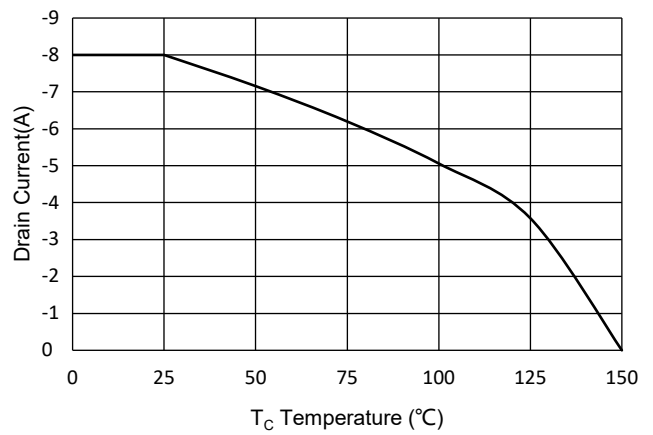
**Fig.8 - Normalized On Resistance Characteristics**



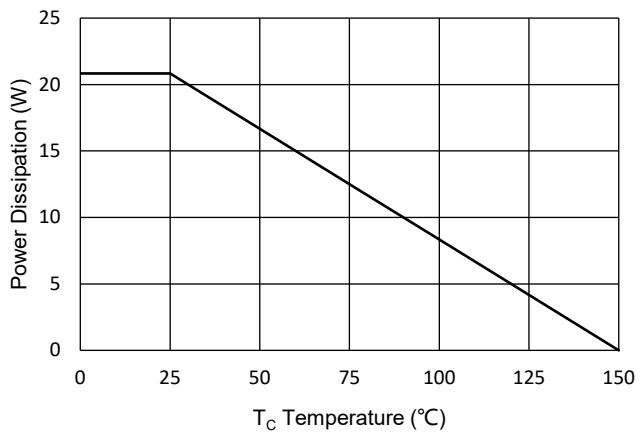
**Fig.9 - I<sub>S</sub> - V<sub>SD</sub>**



**Fig.10 - Drain Current**



**Fig.11 - PD Dissipation**



Curve Characteristics

Fig.12 - Safe Operation Area

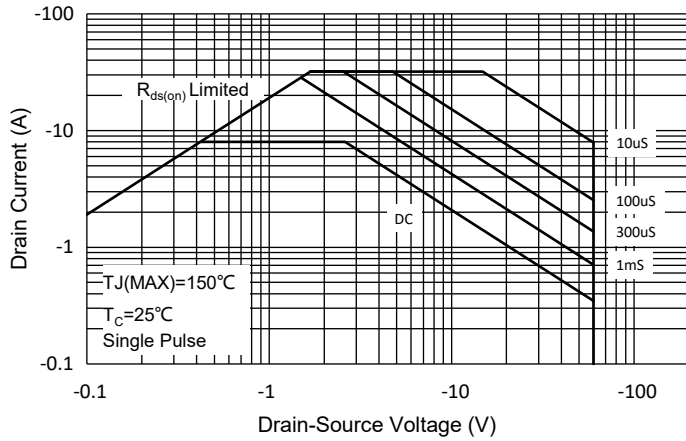
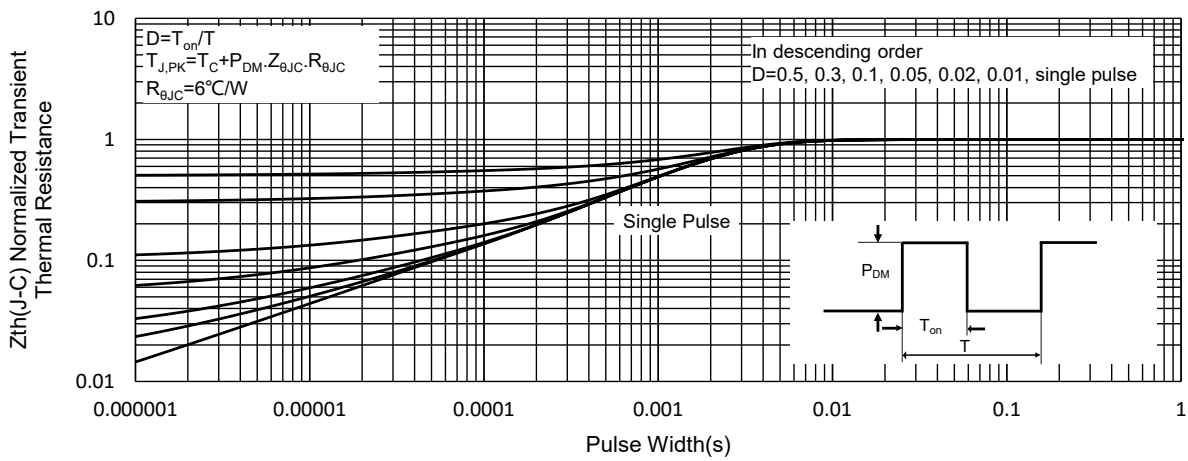


Fig.13 - Normalized Transient Thermal Impedance



## Ordering Information

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

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