

## Features

- AEC-Q101 Qualified
- Split Gate Trench MOSFET Technology
- High Density Cell Design For Ultra Low  $R_{DS(on)}$
- Moisture Sensitivity Level 1
- Halogen Free."Green"Device<sup>(Note1)</sup>
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

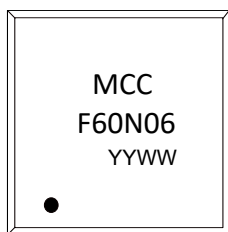
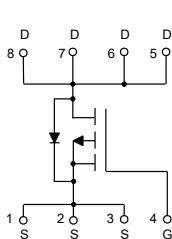
- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance: 60°C/W Junction to Ambient<sup>(Note2)</sup>
- Thermal Resistance: 2.5°C/W Junction to Case

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	$T_C=25^\circ\text{C}$	60
		$T_C=100^\circ\text{C}$	42
Pulsed Drain Current <sup>(Note3)</sup>	$I_{DM}$	240	A
Total Power Dissipation <sup>(Note4)</sup>	$P_D$	60	W
Single Pulse Avalanche Energy <sup>(Note 5)</sup>	$E_{AS}$	95	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.  $T_J=25^\circ\text{C}$ ,  $V_{DD}=50\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $R_G=25\Omega$ ,  $L=0.5\text{mH}$ .

## Internal Structure and Marking Code

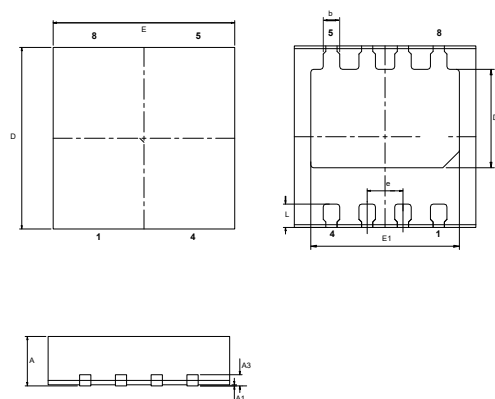


pin1

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

# N-CHANNEL MOSFET

## DFN3333-8(SWF)



DIM	DIMENSIONS				NOTE
	INCHES		MM		
	MIN	MAX	MIN	MAX	
A	0.028	0.031	0.70	0.80	
A1	0.000	0.002	0.00	0.05	
A3	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	0.066	0.074	1.69	1.89	
E1	0.102	0.110	2.60	2.80	
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	1.6	2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		4.5	6	m $\Omega$
		$V_{GS}=4.5V, I_D=20A$		6.8	10	
Gate Resistance	$R_g$	f=1 MHz, Open drain		1.6		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				60	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=20A$			1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=20A, di_F/dt=100A/\mu s$		37		ns
Reverse Recovery Charge	$Q_{rr}$			32		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=30V, V_{GS}=0V, f=1MHz$		1666		pF
Output Capacitance	$C_{oss}$			500		
Reverse Transfer Capacitance	$C_{rss}$			18		
Total Gate Charge	$Q_g$	$V_{DS}=30V, V_{GS}=10V, I_D=20A$		34.5		nC
Gate-Source Charge	$Q_{gs}$			4.6		
Gate-Drain Charge	$Q_{gd}$			9.2		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=30V, V_{GS}=10V,$ $I_{DS}=10A, R_G=3\Omega$		8.9		ns
Turn-On Rise Time	$t_r$			10.6		
Turn-Off Delay Time	$t_{d(off)}$			29.5		
Turn-Off Fall Time	$t_f$			12.4		

**Curve Characteristics**

Fig. 1 - Typical Output Characteristics

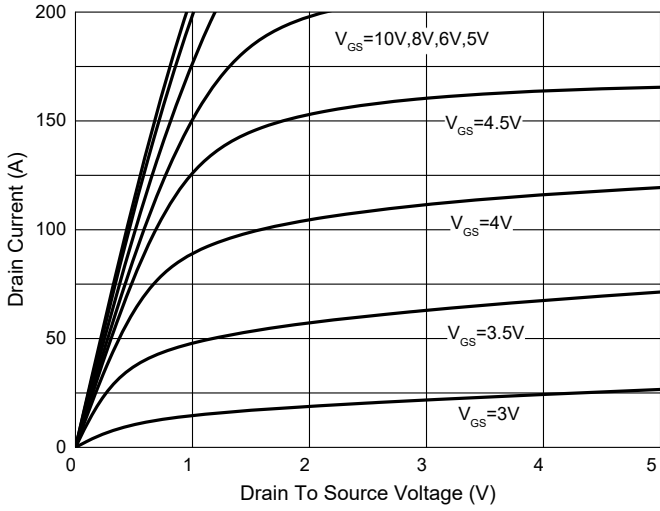


Fig. 2 - Transfer Characteristics

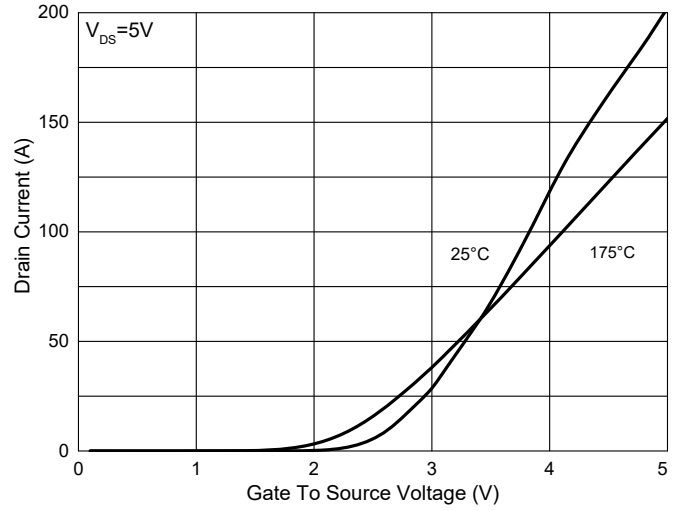


Fig. 3 -  $R_{DS(ON)} - V_{GS}$

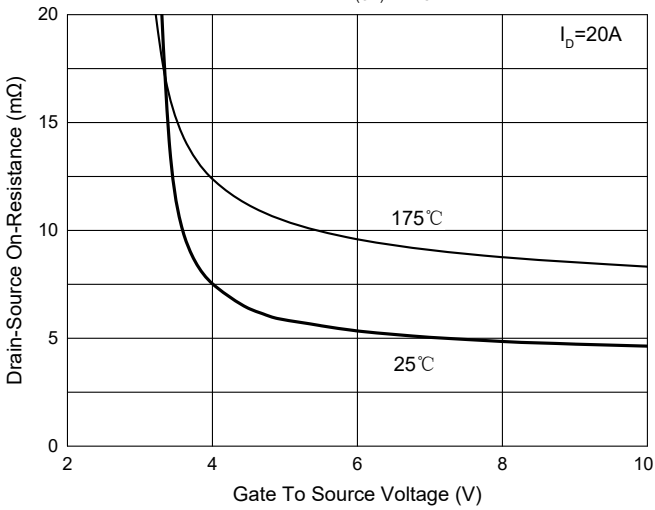


Fig. 4 -  $R_{DS(ON)} - I_D$

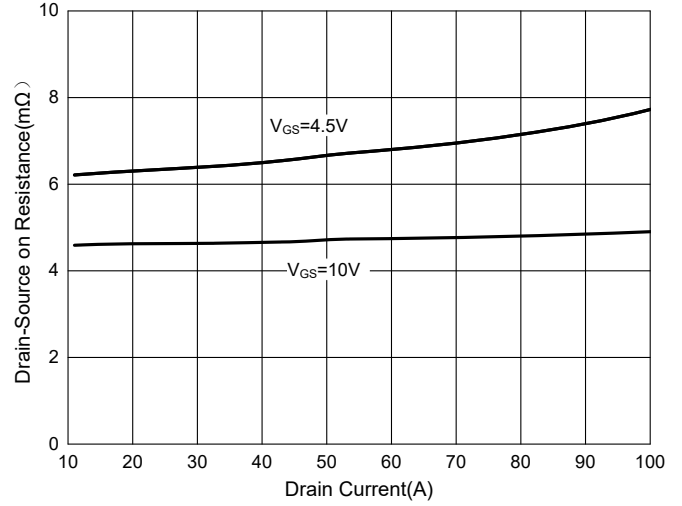


Fig. 5 - Capacitance Characteristics

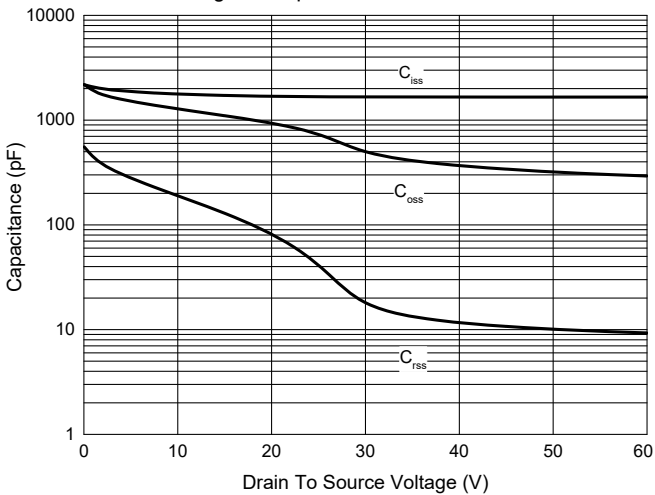
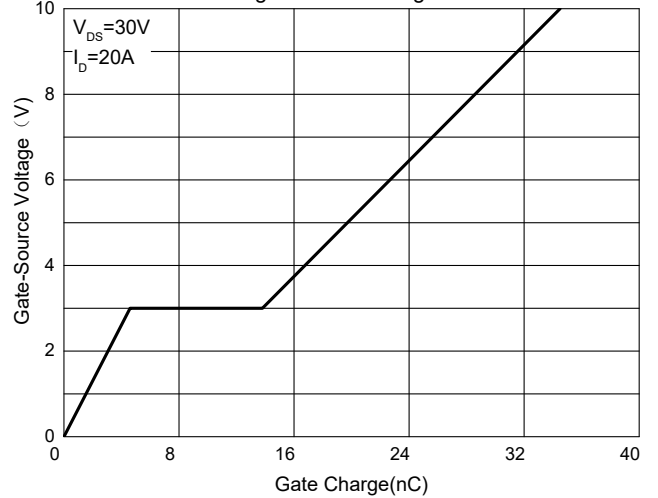


Fig. 6 - Gate Charge



**Curve Characteristics**

Fig. 7 - Normalized Threshold Voltage

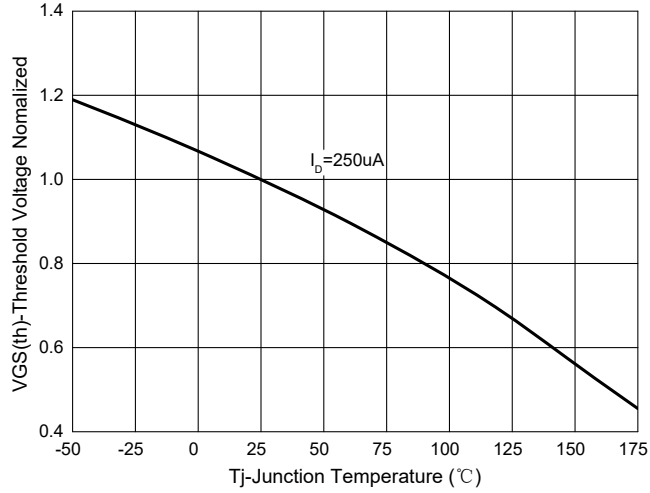


Fig.8-Normalized On Resistance Characteristics

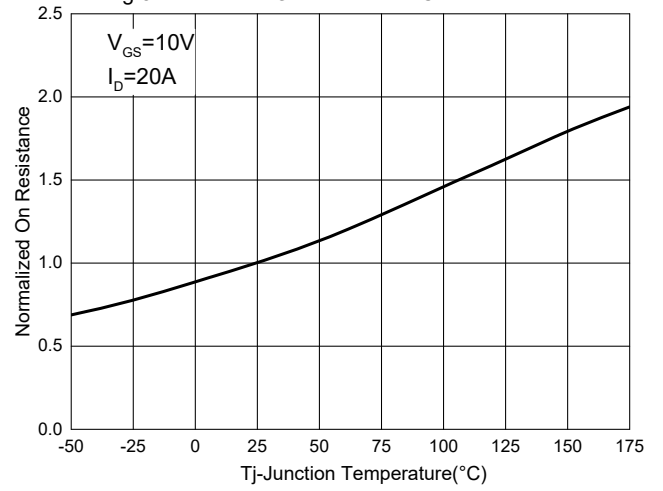


Fig.9 -  $I_s - V_{SD}$

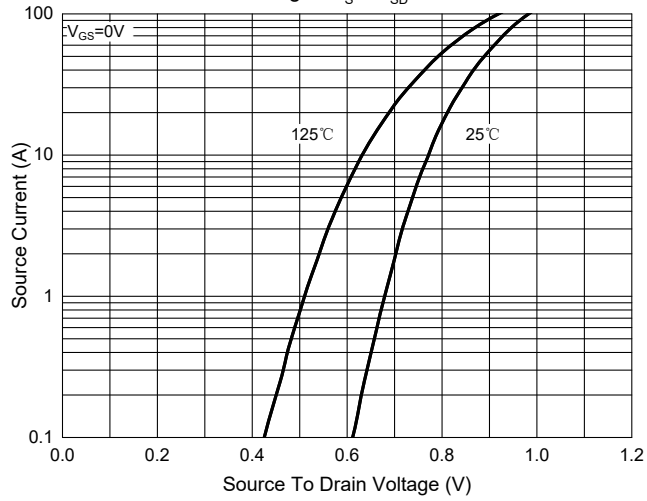


Fig. 10 - Drain Current

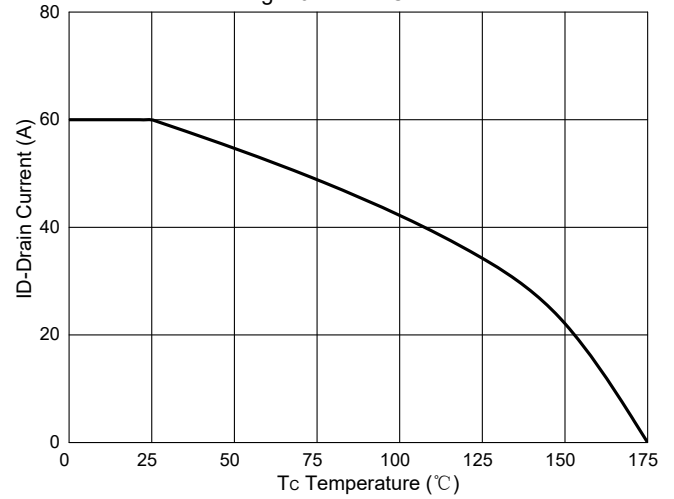
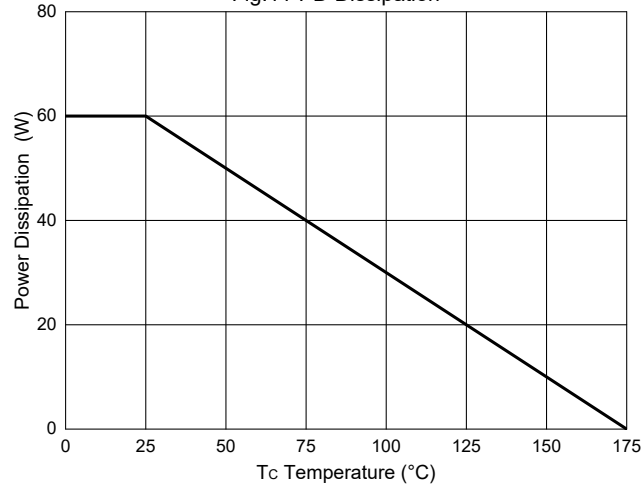


Fig.11-PD Dissipation



**Curve Characteristics**

Fig. 12 - Safe Operation Area

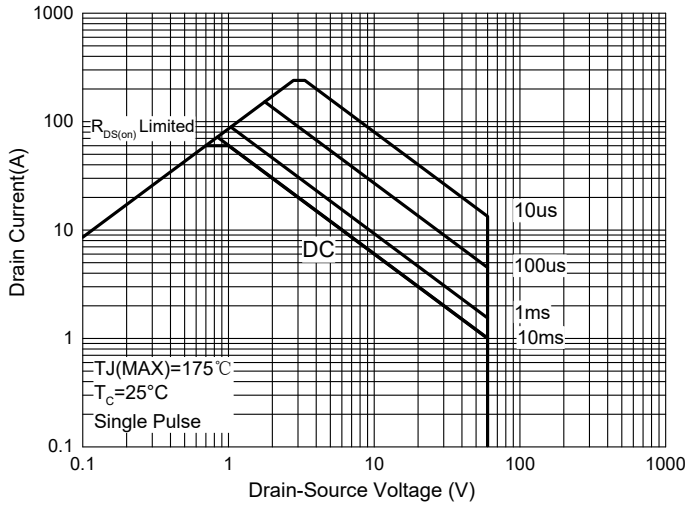
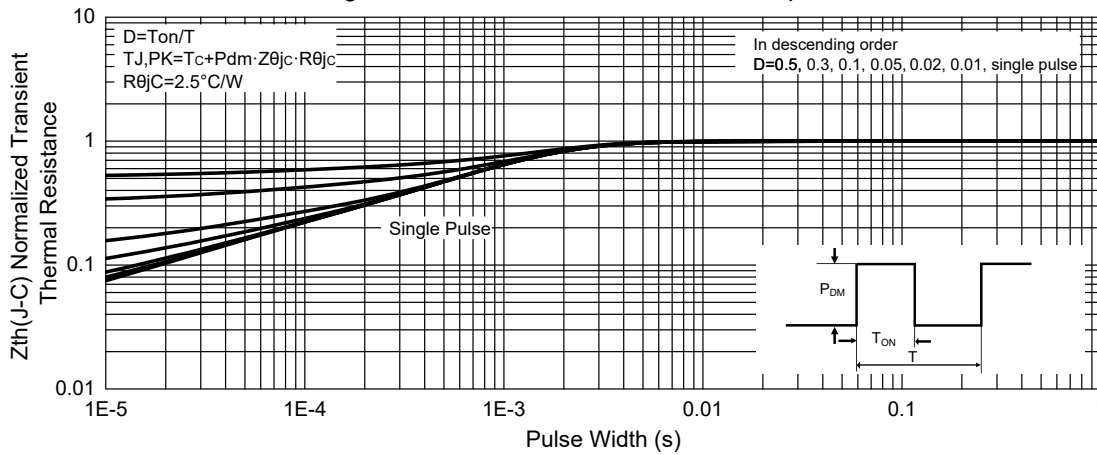


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

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

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