

# MT70G035T

## N-Channel Enhancement Mode Field Effect Transistor

### Product Summary

- $V_{DS} = 70V$
- $I_D = 180A$
- $R_{DS(ON)} = 3.0 m\Omega @ V_{GS} = 10V$

### Features

- Advanced Trench Process Technology.
- High Density Cell Design for Ultra Low On-Resistance.
- Lead free product is acquired.
- RoHS Compliant.
- TOLL Package

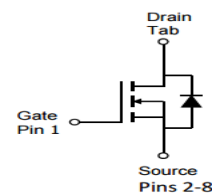
### Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

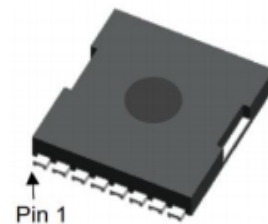


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### Simplified Schematic



### MARKING DIAGRAM & PIN ASSIGNMENT



### Absolute Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Steady State	Units
$V_{DS}$	Drain-Source Voltage	70	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current <sup>1</sup>	180	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>		
$I_S$	Continuous Source Current (Diode Conduction) <sup>1</sup>	180	A
$E_{AS}$	Single Pulse Drain-Source Avalanche Energy <sup>3</sup>	439	mJ
$P_D$	Maximum Power Dissipation	305	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55~150	$^\circ C$

#### Notes:

1. Surface Mounted on 1" x 1" FR4 Board,  $t \leq 10$  Sec.
2. Pulse width limited by maximum junction temperature.
3. The test condition is  $T_J = 25^\circ C$ ,  $V_{DD} = 30V$ ,  $V_{GS} = 10V$ ,  $L = 0.1mH$ ,  $R_G = 25\Omega$ ,  $I_{AS} = 50A$ .

## Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.4	$^{\circ}\text{C/W}$
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## Electrical Characteristics ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

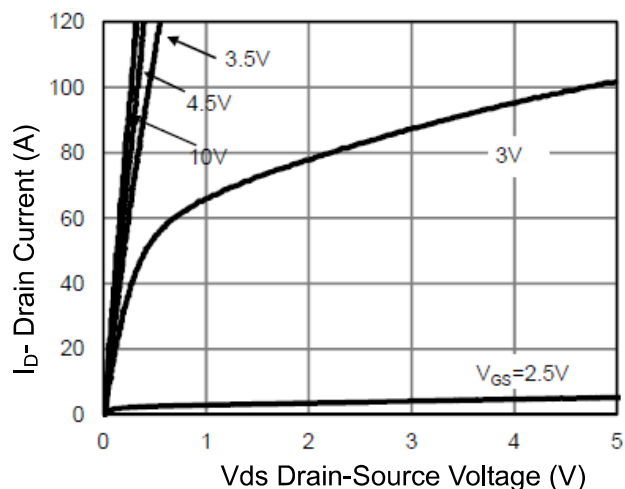
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	70	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=80V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	100	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.4	2.8	3.8	V
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	3.0	5.0	m $\Omega$
<b>Dynamic Characteristics<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=40V, V_{GS}=0V,$ $F=0.1\text{MHz}$	-	4856	-	PF
Output Capacitance	$C_{oss}$		-	980	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	39	-	PF
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=40V, I_D=20A$ $V_{GS}=10V, R_G=3.0\Omega$	-	16	-	nS
Turn-on Rise Time	$t_r$		-	51	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	33	-	nS
Turn-Off Fall Time	$t_f$		-	21	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=40V, I_D=20A,$ $V_{GS}=10V$	-	61	-	nC
Gate-Source Charge	$Q_{gs}$		-	20	-	nC
Gate-Drain Charge	$Q_{gd}$		-	18	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=20A$	-	0.75	1.2	V
Diode Forward Current	$I_S$		-	-	180	A
Reverse Recovery Time	$t_{rr}$	$T_J=25^{\circ}\text{C}, I_F=20A$ $di/dt=100A/\mu s$	-	52	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	79	-	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Note:

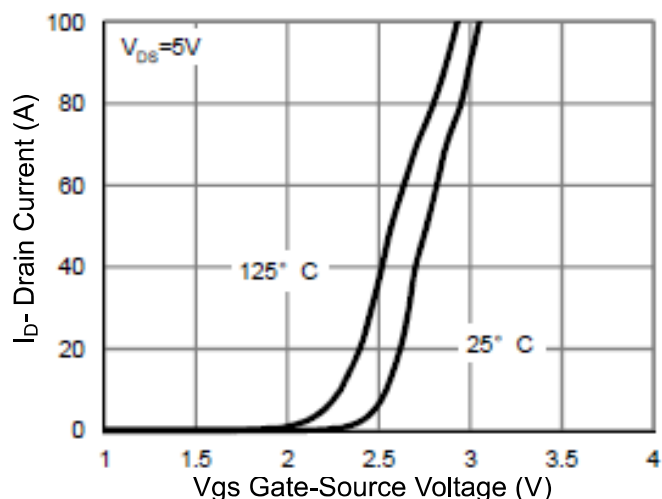
a. Pulse test; pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

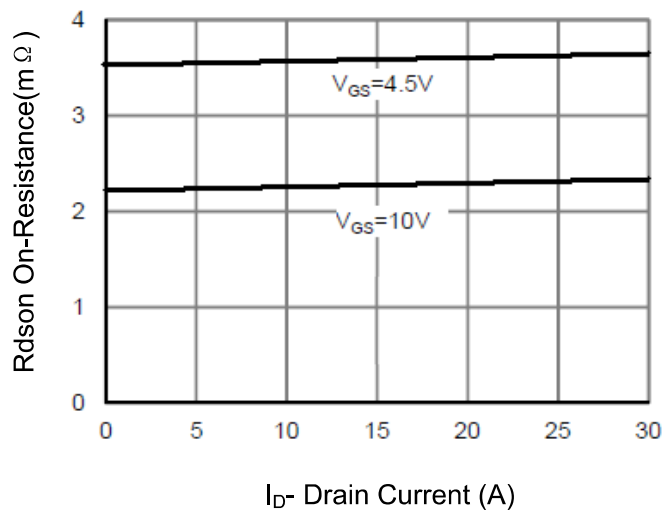
**Typical Electrical and Thermal Characteristics (Curves)**



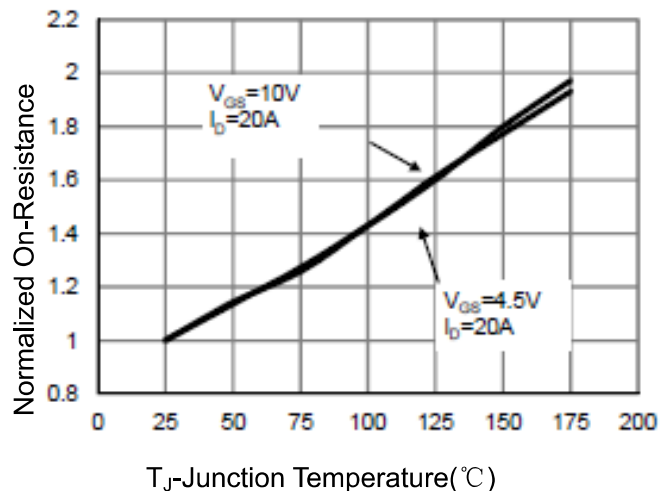
**Figure 1 Output Characteristics**



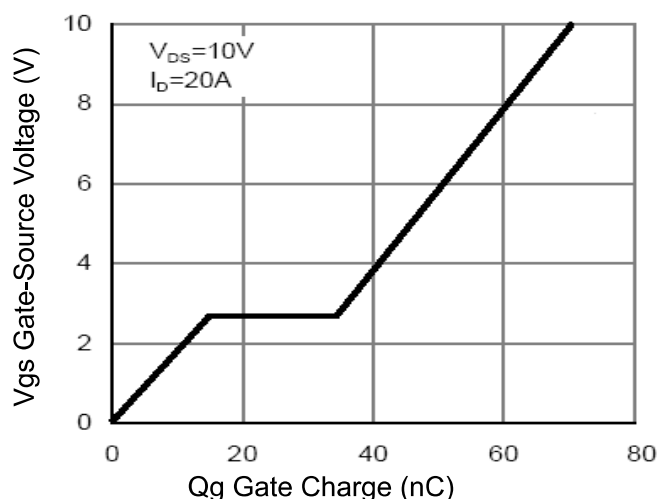
**Figure 2 Transfer Characteristics**



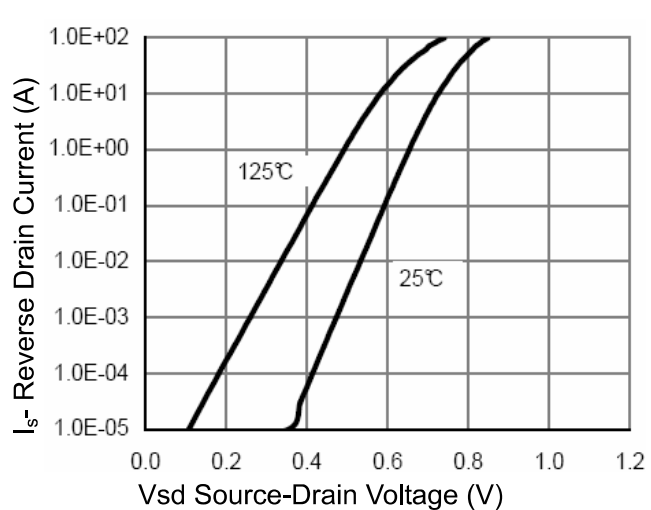
**Figure 3 Rdson- Drain Current**



**Figure 4 Rdson-Junction Temperature**



**Figure 5 Gate Charge**



**Figure 6 Source- Drain Diode Forward**

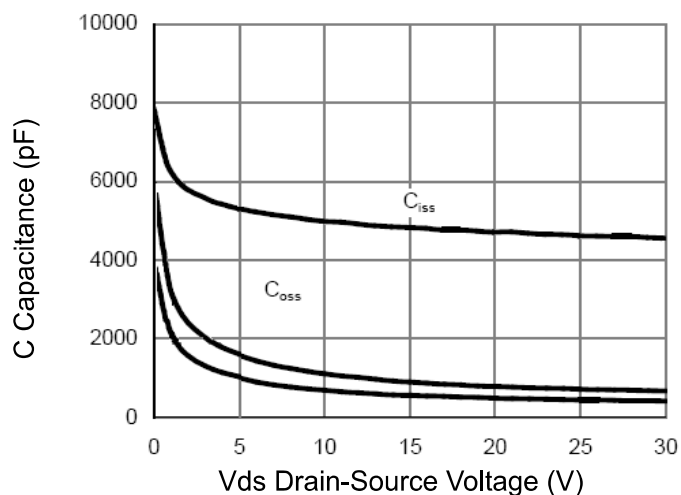


Figure 7 Capacitance vs Vds

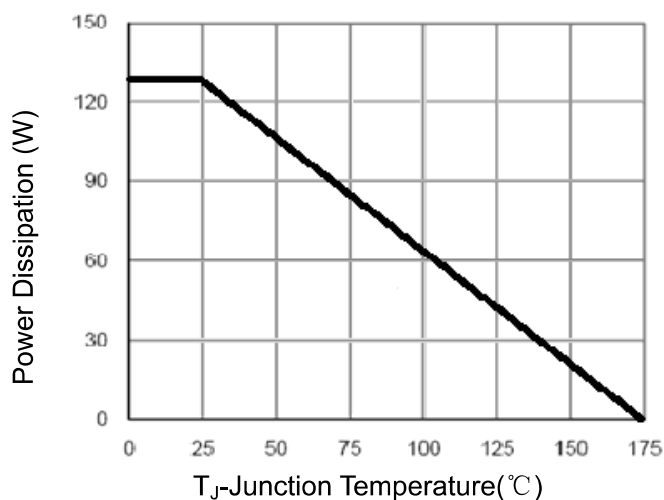


Figure 9 Power De-rating

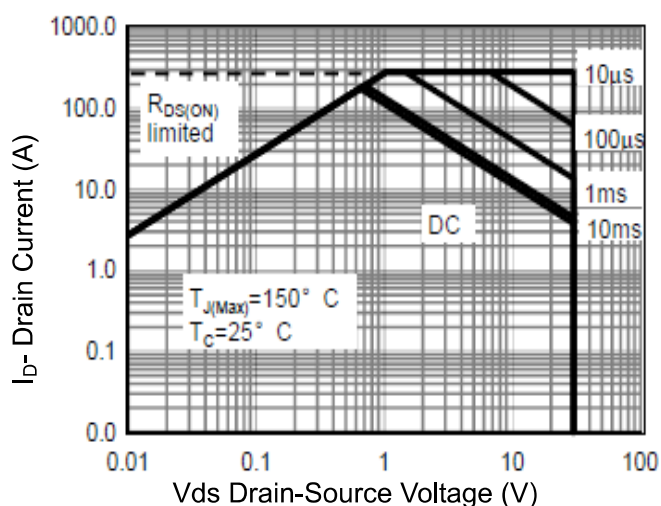


Figure 8 Safe Operation Area

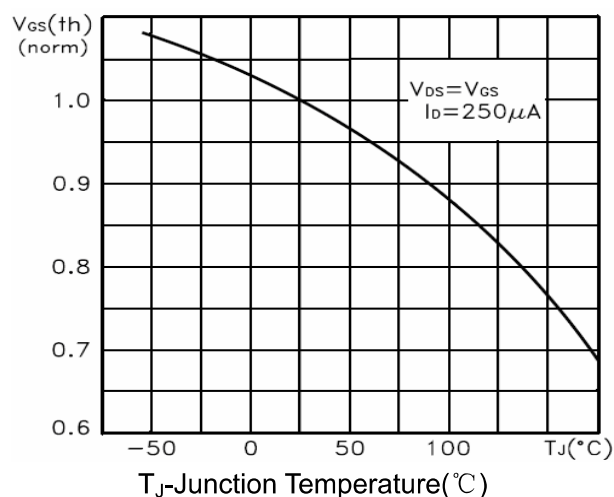


Figure 10 VGS(th) vs Junction Temperature

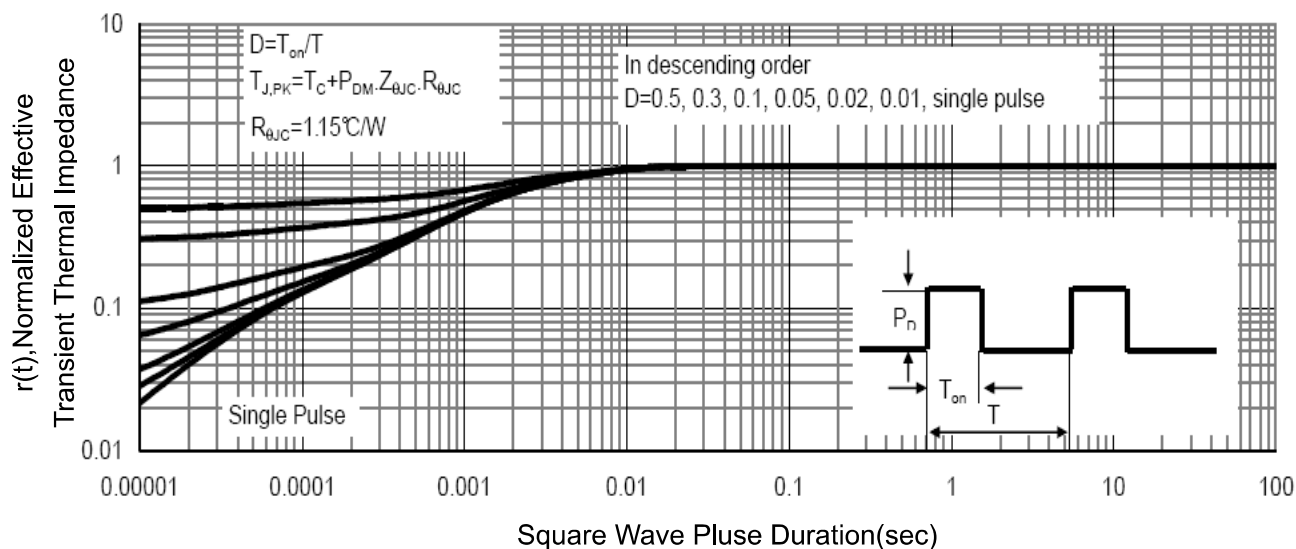
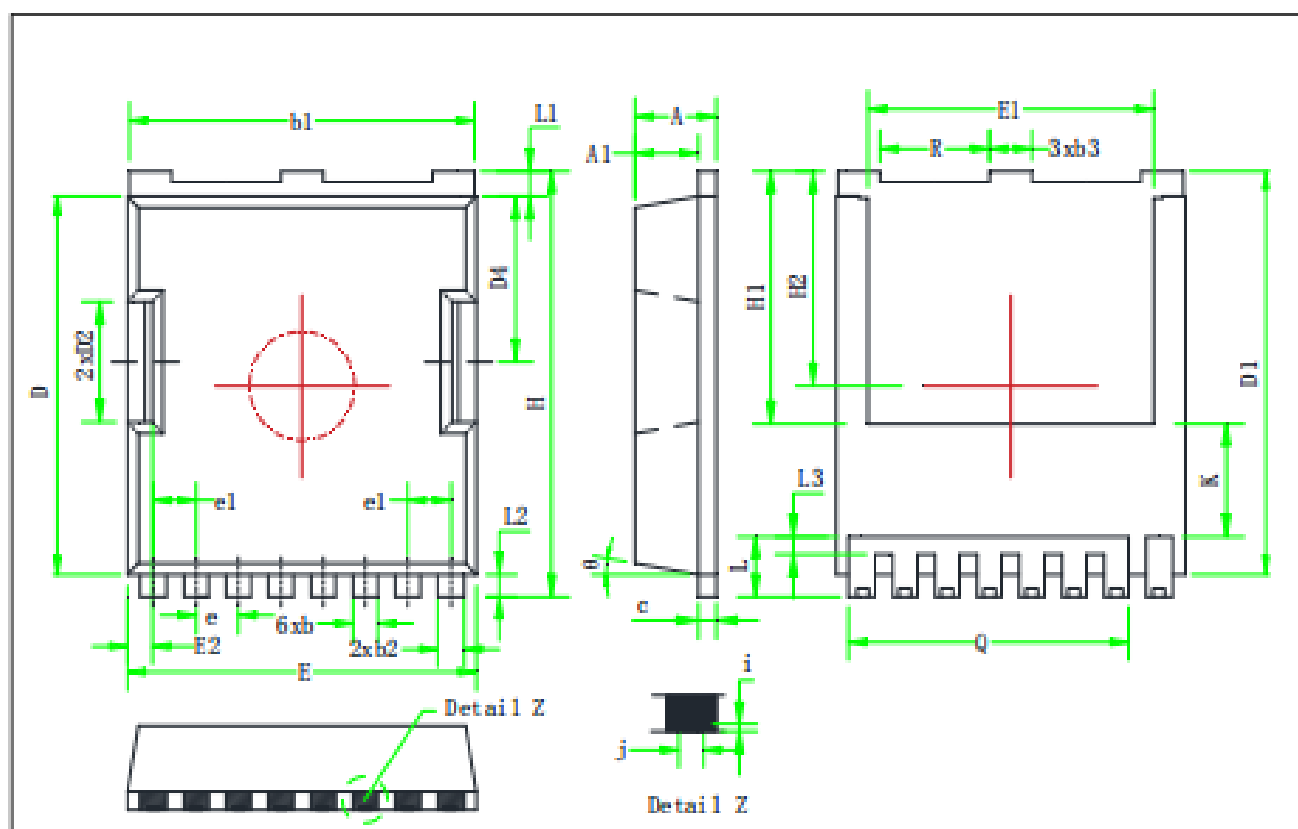


Figure 11 Normalized Maximum Transient Thermal Impedance

## Package Mechanical Data(TOLL)



Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.25	2.30	2.35	E2	0.65	0.70	0.75
A1	1.75	1.80	1.85	H	11.60	11.70	11.80
b	0.65	0.70	0.75	H1	6.95 BSC		
$b_1$	9.75	9.80	9.85	H2	5.90 BSC		
$b_2$	0.70	0.75	0.80	i	0.10 REF		
$b_3$	1.15	1.20	1.25	j	0.35 REF		
c	0.45	0.50	0.55	K	3.10 REF		
D	10.35	10.40	10.45	L	1.55	1.65	1.75
D1	11.00	11.10	11.20	L1	0.65	0.70	0.75
D2	3.25	3.30	3.35	L2	0.50	0.60	0.70
D4	4.50	4.55	4.60	L3	0.40	0.50	0.60
e	1.20 BSC			Q	7.95 REF		
$e_1$	1.225 BSC			R	3.05	3.10	3.15
E	9.85	9.90	9.95	$\theta$	10°REF		
E1	8.00	8.10	8.20				

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