



# ACE1020M

## N-Channel 200-V MOSFET

### Description

ACE1020M uses advanced trench technology to provide excellent  $R_{DS(ON)}$ .

This device particularly suits for low voltage application such as power management of desktop computer or notebook computer power management, DC/DC converter.

### Features

- Low  $r_{DS(on)}$  trench technology
- Low thermal impedance
- Fast switching speed

### Applications:

- PoE Power Sourcing Equipment
- PoE Powered Devices
- Telecom DC/DC converters
- White LED boost converters

### Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	200	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	10	A
$T_C=25^\circ\text{C}$			
Pulsed Drain Current <sup>b</sup>	$I_{DM}$	40	A
Continuous Source Current (Diode Conduction) <sup>a</sup>	$I_S$	10	A
Power Dissipation	$P_D$	50	W
$T_C=25^\circ\text{C}$			
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$R_{\theta JA}$	40	$^\circ\text{C}/\text{W}$
Maximum Junction-to-Case	$R_{\theta JC}$	3	

#### Notes

a. Surface Mounted on 1" x 1" FR4 Board, drain pad using 2 oz copper, value dependent on PC board thermal characteristics.

b. Pulse width limited by maximum junction temperature.

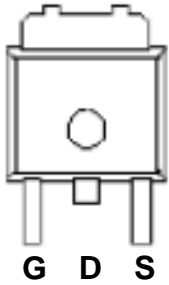


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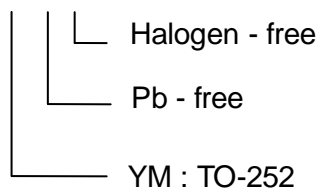
### Packaging Type

TO-252



### Ordering information

ACE1020M YM + H





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### Electrical Characteristics

$T_A=25^{\circ}\text{C}$ , unless otherwise specified.

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	1			V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0 \text{ V}, V_{GS} = 20 \text{ V}$			$\pm 10$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 160 \text{ V}, V_{GS} = 0 \text{ V}$			1	uA
		$V_{DS} = 160 \text{ V}, V_{GS} = 0 \text{ V}, T_J = 55^{\circ}\text{C}$			10	
On-State Drain Current	$I_{D(on)}$	$V_{DS} = 5 \text{ V}, V_{GS} = 10 \text{ V}$	15			A
Drain-Source On-Resistance	$r_{DS(on)}$	$V_{GS} = 10 \text{ V}, I_D = 4 \text{ A}$			400	m $\Omega$
Forward Transconductance	$g_{fs}$	$V_{DS} = 15 \text{ V}, I_D = 4 \text{ A}$		10		S
Diode Forward Voltage	$V_{SD}$	$I_S = 5 \text{ A}, V_{GS} = 0 \text{ V}$		0.79		V
<b>Dynamic</b>						
Total Gate Charge	$Q_g$	$V_{DS} = 100 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 4 \text{ A}$		14		nC
Gate-Source Charge	$Q_{gs}$			3.8		
Gate-Drain Charge	$Q_{gd}$			3.8		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 100 \text{ V}, R_L = 5 \Omega, I_D = 4 \text{ A},$ $V_{GEN} = 10 \text{ V}, R_{GEN} = 6 \Omega$		3.7		nS
Rise Time	$t_r$			7.7		
Turn-Off Delay Time	$t_{d(off)}$			26		
Fall Time	$t_f$			12		
Input Capacitance	$C_{iss}$	$V_{DS} = 15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		807		pF
Output Capacitance	$C_{oss}$			81		
Reverse Transfer Capacitance	$C_{rss}$			38		

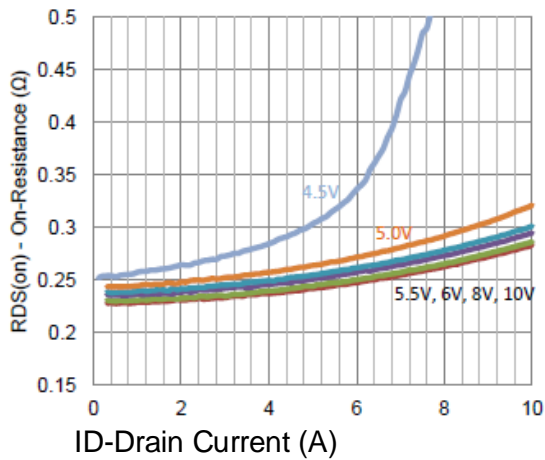
Note:

- Pulse test: PW  $\leq 300\mu\text{s}$  duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.

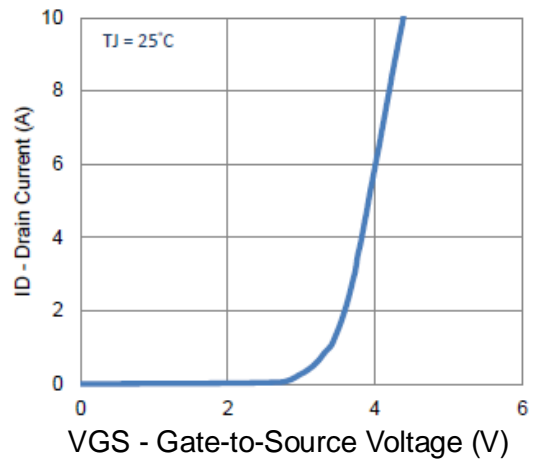


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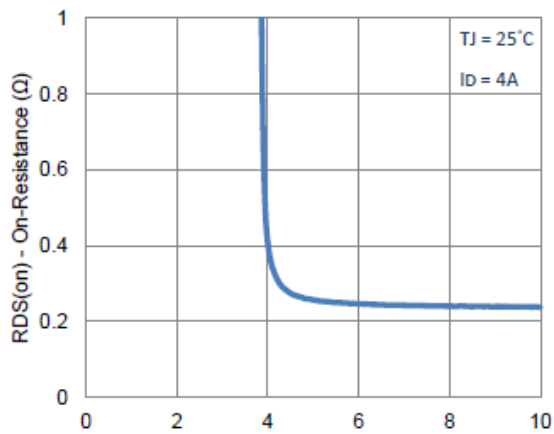
## Typical Performance Characteristics (N-Channel)



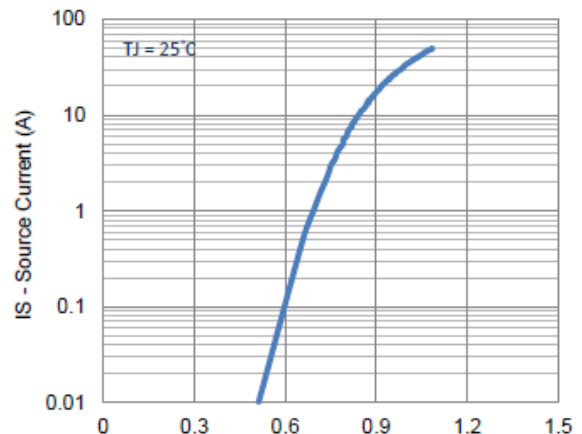
1. On-Resistance vs. Drain Current



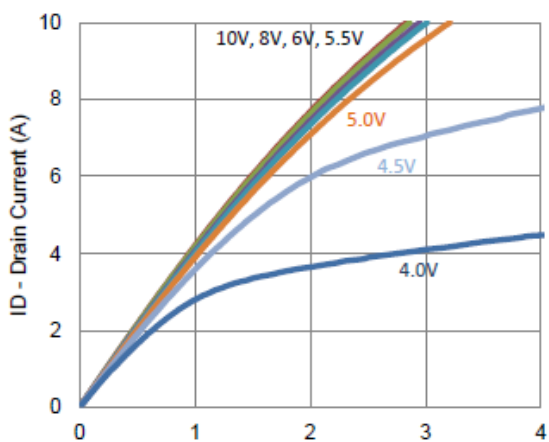
2. Transfer Characteristics



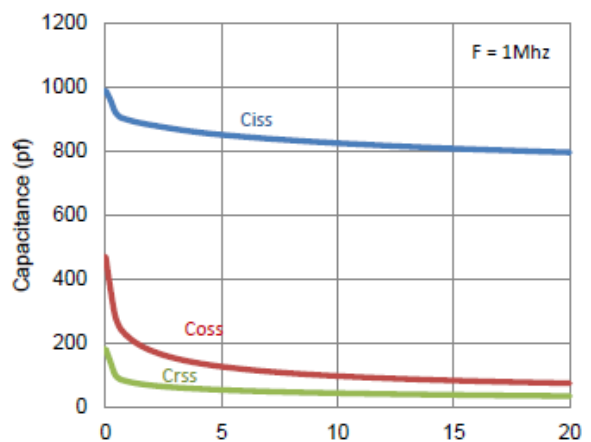
3. On-Resistance vs. Gate-to-Source Voltage



4. Drain-to-Source Forward Voltage



5. Output Characteristics

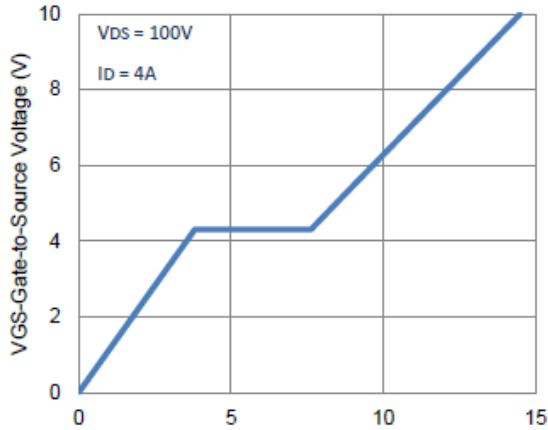


6. Capacitance

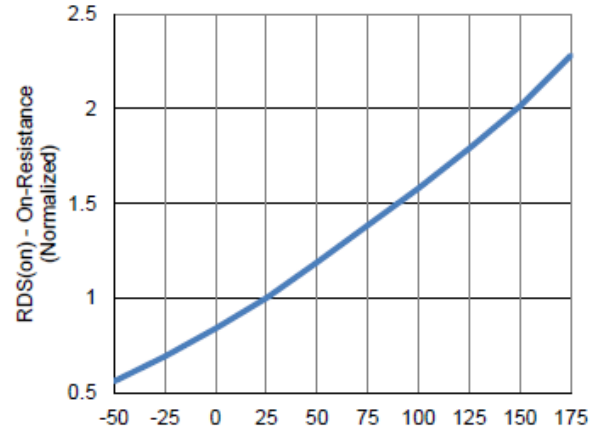


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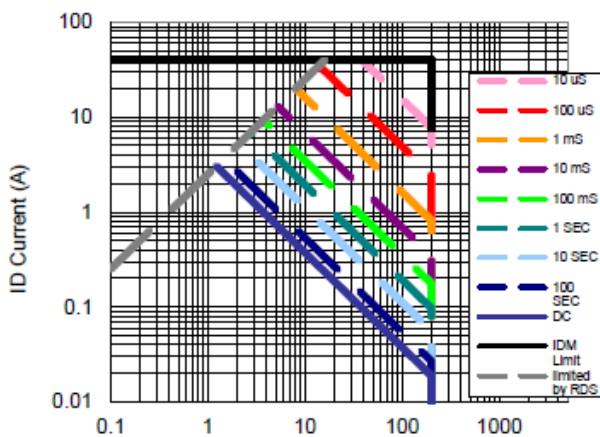
## Typical Performance Characteristics



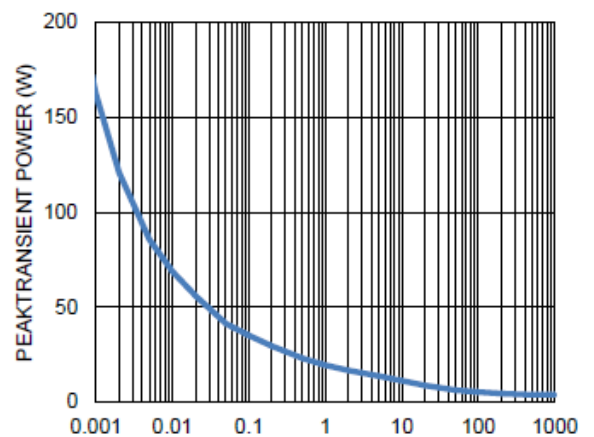
Qg - Total Gate Charge (nC)  
7. Gate Charge



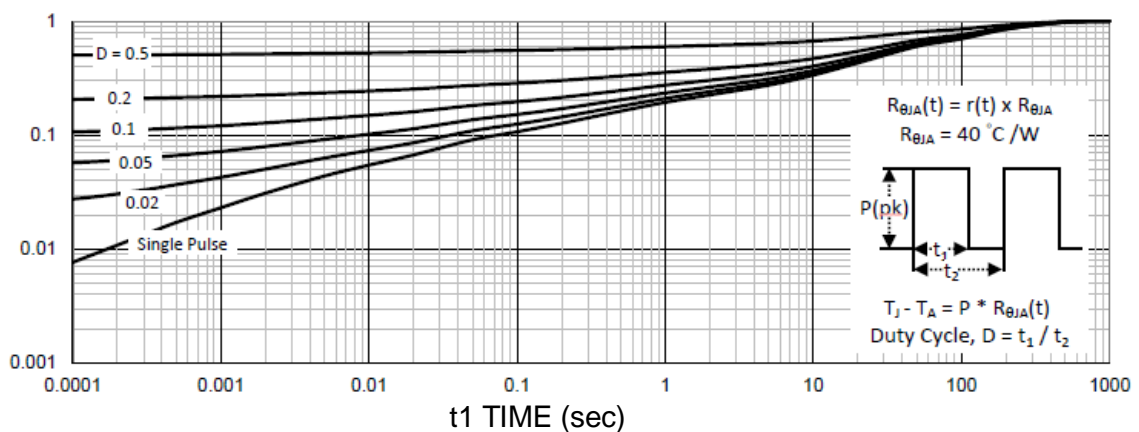
TJ - Junction Temperature(°C)  
8. Normalized On-Resistance Vs Junction Temperature



VDS Drain to Source Voltage (V)  
9. Safe Operating Area



t1 TIME (SEC)  
10. Single Pulse Maximum Power Dissipation



t1 TIME (sec)  
11. Normalized Thermal Transient Junction to Ambient

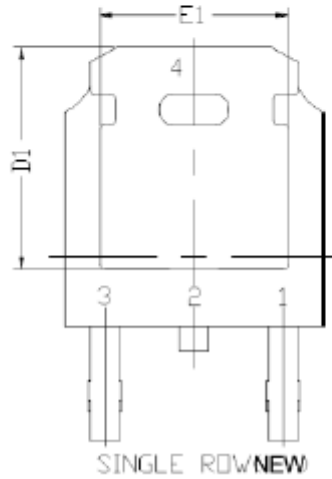
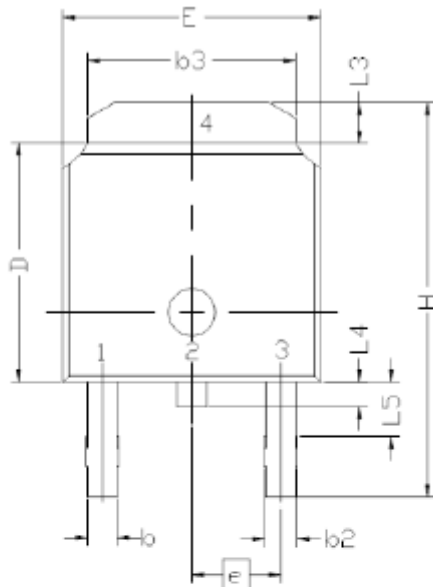


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### Packing Information

TO-252



SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
E	6.40	6.60	6.731
L	1.40	1.52	1.77
L1	2.743 REF		
L2	0.508 BSC		
L3	0.89		1.27
L4	0.64		1.01
L5			
D	6.00	6.10	6.223
H	9.40	10.00	10.40
b	0.64	0.76	0.88
b2	0.77	0.84	1.14
b3	5.21	5.34	5.46
e	2.286 BSC		
A	2.20	2.30	2.38
A1	0		0.127
c	0.45	0.50	0.60
c2	0.45	0.50	0.58
D1	5.30		
E1	4.40		
θ	0 °		10 °



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### Notes

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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